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MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, NEW YORK, 1887.

From Wednesday, August 10, until the evening of Tuesday, August 16, is the time allotted for the meeting of the association. The halls of Columbia College will have been placed at the service of the society, and the official headquarters will be at the Buckingham Hotel, on Fifth Avenue. By invitation, the various colleges, societies, and other public institutions of this city have united in organizing a strong local committee, of which President F. A. P. Barnard is chairman, Professor H. L. Fairchild secretary, and General T. L. James treasurer. Mrs. A. B. Stone is chairman of the ladies' reception committee, Professor D. S. Martin of the committee on invitations, and Professor J. S. Newberry of the committee on scientific papers. Other committees have also been provided, namely, on finance, rooms, excursions and transportation, on the mail, telegraph, and express, etc.

The following are the officers: President, S. P. Langley, of Washington; annual vice-presidents: A, mathematics and astronomy, William Ferrel, of Washington; B, physics, William A. Anthony, of Ithaca, N. Y.; C, chemistry, Albert B. Prescott, of Ann Arbor, Mich.; D, mechanical science, Eckley B. Coxe, of Drifton, Pa.; E, geology and geography, Grove K. Gilbert, of Washington, D. C.; F, biology, William G. Farlow, of Cambridge, Mass.; H, anthropology, Daniel G. Brinton, of Media, Pa.; I, eco-

(*Continued on p.* 100.)

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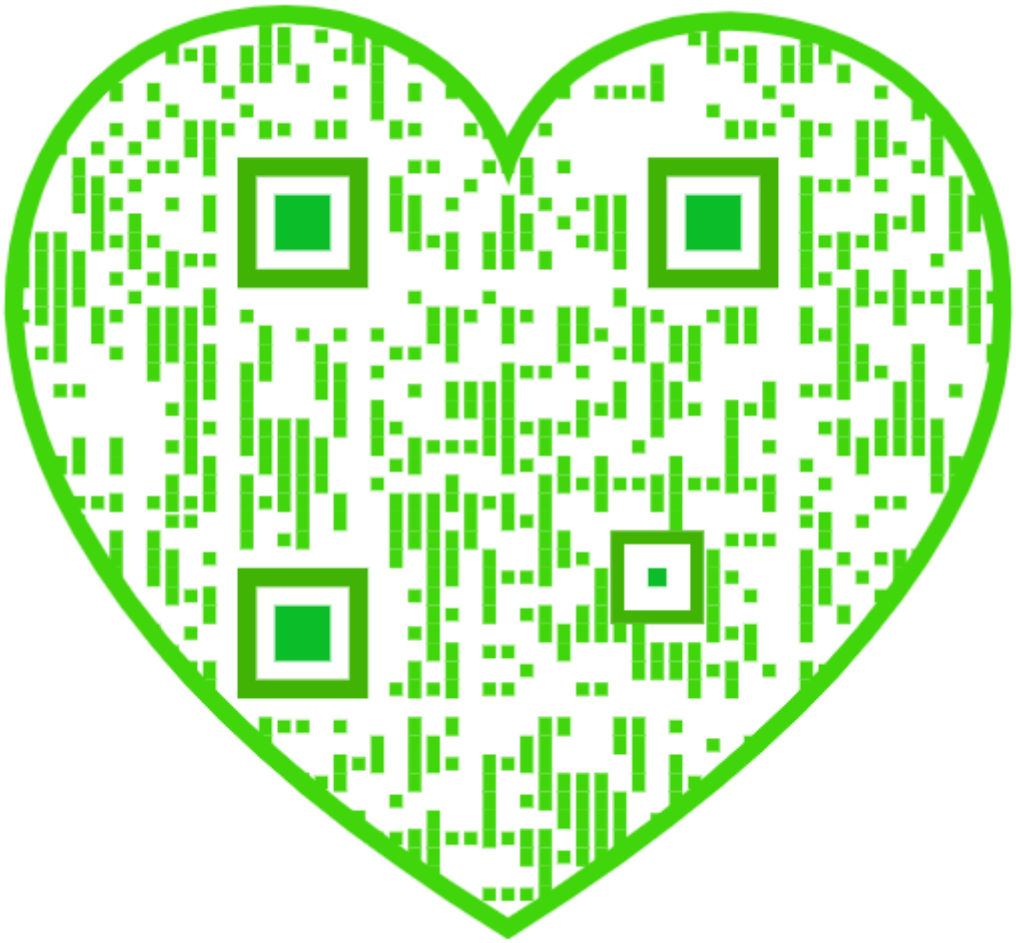

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NEW YORK, SATURDAY, AUGUST 13, 1887.

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The Aerophore.

An apparatus under this name, designed to moisten the air of mills, is about to be introduced into this country. It has been exhibited by Mr. E. Klaber, No. 10 Cortlandt Street, New York. It is well known that static electricity is in many instances the source of great annoyance and trouble in mills, more especially in silk factories. In these the fabric, by friction and the manipulations of manufacture, becomes so charged with electricity that it cannot be easily handled. The mutual attraction of the different pieces is very great. The same phenomena are observed in somewhat modified degree in printing offices. The sheets of paper become so electrified as to adhere strongly to each other. The aerophore is an apparatus designed to moisten the air so as to prevent this high degree of electrification.

A piece of pipe, about twenty inches in diameter, contains the moving portions of the apparatus. At the base is a circle of very fine water jets. These discharge each a fine column of water, about as thick as a steel knitting needle, directly upward against a corresponding series of buttons or convex studs placed above them. The impinging of the water against these breaks it into the finest spray. By connections nearer the top of the inclosing pipe or shell, more water is admitted, which rotates a horizontal water wheel, and then returns to the supply reservoir or may be suffered to escape. The water wheel turns a strong ventilating or aspirating fan, which draws air in through the base and discharges it at the top. The discharge takes place through a suitable hood. The action can be understood from what has been said.

At the base the water discharged by the circle of jets is atomized in the most perfect manner. The fine spray is carried up by the air, is drawn through the apparatus, and is delivered into the apartment through the hood. A perfect cloud of the finest spray is thus produced. The chilling effect is very remarkable. The hand held in the cloud is cooled as if exposed to the atmosphere of an ice house.

If the apparatus is to be used in hospitals, a receptacle for carbolic acid or any desired disinfectant is attached, so that a regulated quantity can be discharged with the spray into the atmosphere.

It is stated that this machine has met with much success abroad, having been introduced into a great number of mills in France and Germany. It is said that it has increased in one instance the production of a mill by a large percentage, by suppressing electrical disturbance.

Relation of Capital to Wages.

Mr. Atkinson's pet proposition is that as much as ninety per cent of the product of industry goes to workingmen in wages or otherwise, leaving but ten per cent as the reward of capital and management. In one of his *Century* articles he asserts that if any one can make ten per cent profit on the wages he must pay, capital will be found for the enterprise. The *Christian Union* has rendered an important service in showing that these propositions are disproved by the very figures that Mr. Atkinson has relied on to prove them. In calculating his percentages he has confounded two entirely distinct and different quantities. The capitalist engages in business not when he can make ten per cent on the wages he must pay, but when he can make ten per cent on the capital invested. This would be the same thing as ten per cent on the wages paid only if the annual wages equaled the capital invested; but, according to the census of 1880, the capital invested in American manufactures was $2,790,000,000, and the cost of labor was $947,000,000. That is to say, the capital invested was nearly three times the annual wages, and ten per cent on capital would be nearly thirty per cent on wages.

In other industries than manufacturing, and in particular manufacturing industries, the proportion of capital to wages is very much larger. The capital invested in railroads is twenty times the annual wages bill, and in 1880 the owners of the railroads, instead of getting only one-tenth of the wealth earned, received more than one-half, the profits of capital having been $227,000,000 and the wages of labor only $195,000,000. In the paper manufacture the relative rewards of capital have been yet greater, as appeared from the noteworthy table prepared by Mr. George K. Holmes for the *Paper World* for March, and published in *Work and Wages* the same month. The *Christian Union* copies this table, and says that it "merits the careful study of economic students." It shows that the average profits of the paper manufacturer for the thirty years from 1850 to 1880 were not ten per cent, but 142 per cent of the wages paid!

Taking all the industries of the country together, it appears that the capital invested is $40,000,000,000 and the annual product $9,000,000,000; so that, if capital gets as much as eight per cent on investment, it gets more than thirty-five per cent of the annual product. This estimate, the *Christian Union* shows, is fully confirmed by the income tax statistics of European countries. In the kingdom of Saxony the national income is divided as follows: From lands and houses, $55,000,000; from stocks and negotiable paper, $27,000,000; from wages, $76,000,000; from profits in manufactures and trade, $98,000,000. From the total of $256,000,000, the interest on mortgages—$21,000,000—is deducted, leaving a net national income of $235,000,000, of which it will be seen the wage earners' share is less than one-third. "The Prussian statistics recently published by Soetbeer exhibit a similar state of affairs; while in Great Britain, according to Baxter, one million persons received in 1868 as large an income as the remaining eleven millions!"—*Work and Wages.*

A Supposed New Force.

At a recent meeting of the Royal Society, Professor Crookes gave a description of the experiments of M. J. Thore, which are attributed by him to a new force inherent in the human organism. The fundamental experiments are performed in a specially constructed apparatus, which consists of a glass box with movable windows, and containing suspended in it, by means of a very fine cocoon silk fiber, a small cylinder of ivory, glass, or metal. By means of a ball and socket arrangement, a second cylinder, called the pillar, can be brought close to the first, and placed in different positions with regard to it. The cylinder is first brought to rest, and the observer sits down in front of the apparatus, with his face some 8 inches from the suspended cylinder. The pillar is then brought near to the suspended cylinder, when, on opening the glass window, it commences to rotate. This rotation is in the opposite direction to the hands of a clock when the pillar is to the right of the suspended cylinder.

It has also more recently been shown by M. Thore that the action is more marked when the observer's hand is touching the support of the pillar, and that if the right hand be used the movement is in the direction of the hands of a watch, but the opposite effect is noticed with the left hand. Professor Crookes is, however, of the opinion that the phenomena observed can be accounted for as the result of radiation, although he admits that at present this theory is not able to explain all the experiments which M. Thore has brought forward. That radiation can produce many such effects has been shown by the experiments devised by Professor Crookes when investigating these phenomena. A flask of boiling water, or a candle, or some other source of heat, causes the suspended cylinder to revolve in the same way as does the human face. And a bottle of hot water produces rotation when the observer is at a long distance from the apparatus, when the movements can be examined by means of a telescope.

Radiation may give rise to the observed phenomena, either by producing a current of warm air, causing an indraught of cold air from all sides to strike against the suspended cylinder, and so determine its rotation, or an increase in the surface temperature of the two cylinders may produce a greater molecular pressure between them, and thus give rise to motion in the freely suspended one in a similar way to the movements produced in a radiometer. Professor Crookes suggests that experiments performed with the apparatus in tubes under diminished pressure might possibly decide which of these two hypotheses is the more probable.—*Industries.*

Why Snow Destroys Marble Statuary.

The results of the examination of snow taken from different places in Munich and its neighborhood by Mr. Sendtner, says the *Pharmaceutical Journal* (London), would seem to indicate not only that snow has a considerable faculty for absorbing sulphurous acid from the atmosphere, but that the absorption goes on continuously for some time. Mr. Sendtner ascertained that, on one day when snow fell, sulphurous and sulphuric acids were present in it in fairly equal proportions, but on the second day almost all the sulphurous acid had been ozonized to sulphuric acid. In the vicinity of chimneys and gas works the absorption would of course be greater.

This great absorptive power toward sulphurous and sulphuric acids is considered of great practical interest as explaining the destructive influence of snow upon marble statuary.

A Copyright Case.

Schumacher *vs.* Schwencke, Jr., Circuit Court, S. D., New York, 1887.

Coxe, J.—Complainants obtained a copyright upon a water-colored painting or sketch called "Telegram;" made lithographic copies therefrom, and sold them as cigar labels, book covers, etc. The defendants sold cigar labels which were copies of the complainants' lithographic copies.

Although the law recognizes a distinction between a painting and a print, a copyright for the former will protect its owner in the sale of copies thereof, even though they may appropriately be called prints, and a party who copies such copies will be guilty of infringement.

The owner of a copyrighted painting by publishing lithographic copies thereof does not lose the right to restrain others from copying these copies.

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Naval Strength of the World.

It appears from the "Universal Register" for 1887, issued by the committee of "Lloyd's Register of British and Foreign Shipping," that Great Britain has 6 guns capable of penetrating 36 inches of unbacked iron, and 16 others which can penetrate 28 inches of the same material. Italy has 20 guns which can penetrate 33 inches of iron. France 14 guns which can pierce 27 inches, and 14 others able to penetrate 25 inches of unbacked iron. Russia has 20 guns and Spain 2 equal to the penetration of 24 inches of iron, and no other power has any guns capable of an equivalent result. In other words, of guns able to penetrate 24 inches of unbacked iron, France has 28; Italy, 20; Russia, 20; Spain, 2; and Great Britain, 22. Next, regarding the speeds of their war ships, we find the several powers stand as follows:

Ships of 20 knots and above: England, 1; France, 1; Italy, 10; Spain, 2, and other European nations, 4. Of 19 knots speed England has 11 ships; France, 10; Germany, 3; Italy, 2, and other nations, 9. Of 18 knot ships England has 5; France, 7; Germany, 2; Italy, 6, and other nations, 6. Our supremacy is, however, chiefly seen in 17 knot ships, of which we have 25, mounting 181 guns; France, 4 of 20 guns; Italy, 5 of 40 guns; and other nations, 4 of 19 guns. England has 11 ships of 90 guns that can steam 16 knots, whereas France has 3 only, of 58 guns. At 15 knots France beats us with 16 ships of 214 guns, as compared with our 12 ships of 126 guns; and at 14 knots France has 28 ships of 334 guns, whereas we have only 15 ships of 252 guns. Summarizing these figures, it appears that with speeds above 14 knots we have 80 ships of 795 guns, France, 69 of 699 guns, Germany, 35 of 285 guns, and Italy, 41 of 201 guns.

Out of a total mercantile tonnage now afloat of 20,943,650, Great Britain and her colonies own 10,539,136. The total steam mercantile tonnage of the world is 10,531,843, and of this Great Britain and her colonies own no less than 6,595,871, or nearly two-thirds of the whole.

The Railway Jubilee Celebrations at Crewe.

On Monday, July 4, the great railway center of Crewe held high festivity. The occasion for this was of a fourfold character, viz., the celebration of the Queen's jubilee, the 50th anniversary of the opening of the Grand Junction line through Crewe, the presentation of a public park to the town by Sir Richard Moon, Bart., as chairman of the London & North-Western Railway Company, and the completion of the 3,000th engine built at Crewe works. A special feature at the commencement of the day's proceedings was the presentation by the mayor (Mr. F. W. Webb) of the honorary freedom of the borough to Sir Richard Moon. After this ceremony had been performed, luncheon was served in the drawing offices of the works to the directors and the chief officials of the company, and also to a large number of invited guests. After luncheon the mayor, in a short speech, was enabled from his position as locomotive superintendent of the company to give some interesting statistics regarding the present extent and working of the London & North-Western system. He stated that a year or two before the Queen began her reign, Crewe had only a population of 150, while now it has close upon 30,000 inhabitants, and is the seat of probably the finest locomotive and engineering works in the world. The space covered by the works amounts to something like 120 acres, and about 7,000 persons are employed therein. He also stated that the company has now a capital of £110,000,000, that its annual revenue is £10,000,000, and that each year it expends half that sum. Its servants number 60,000, some 16,000 being engaged in the locomotive department alone. The number of miles over which its rolling stock travels is 2,500, and on the North-Western system there are 800 stations. There are also 28,000 signal levers in use, and 13,500 signal lamps lighted each night. Each year 60,000,000 passengers are conveyed along its lines, in addition to 33,000,000 tons of goods and minerals. The company owns 50,000 wagons, 5,000 carriages, 3,000 horses, 20 steamships, and 2,500 engines. These engines register a mileage annually of over 54,000,000 miles, averaging nearly 150,000 miles a day or 104 miles a minute. This mileage was equivalent, Mr. Webb remarked, to the engines making a journey round the world every four hours; and so great was the wear and tear that a new engine had to be brought into use every five days. From the drawing office the company were taken to the new park, and on the way were shown the 3,000th engine built at the Crewe works, which had been placed near the park entrance. The ceremony of presentation was then gone through on the grand stand erected in the park. Mr. Webb, the mayor, received from Sir Richard Moon all the rights and privileges connected therewith on behalf of the town of Crewe. After this an address and a gold medal commemorative of the occasion were presented to the chairman by the mayor. A very pleasing feature at this stage of the proceedings was the introduction by Mr. Webb of some of the oldest workmen connected with the Crewe works. This is, we think, as it should be, and we are pleased to record here that as regards the immense works coming under the superintendence of Mr. Webb there is an exception to the often repeated complaint that, owing largely to the development of joint stock concerns, the old kindly feeling and personal connection between employer and employed are fast dying out.

One of the workmen introduced (an old veteran of the foot plate, and now pensioned by the company) was said by Mr. Webb to have driven the locomotive which carried to Liverpool the news of the birth of the Prince of Wales, as it was then impossible to send the information by telegraph. The whole of the town was profusely decorated with flags, festoons, and bunting, and the festivities were kept up in the new park until late in the evening. Judging from the large crowd which gathered in the park the inhabitants greatly appreciated the entertainment which had been provided for them.—*Industries.*

Liquid Fuel for Ironclads.

The Russian Minister of Marine has ordered liquid fuel furnaces to be fitted to the ironclad Tchesme, now under course of completion at Sebastopol. The decision is one of a very important character, since, although liquid fuel has been applied to vessels of fairly large dimensions, this is the first time the use of it has been attempted on ironclads.

The Tchesme belongs to the fleet of heavy ironclads Russia is now building for the Black Sea. Three are already launched, and three more are to be constructed at no distant date. The Tchesme, like the Sinope, launched a few weeks ago, has a displacement of over 10,000 tons, and carries 16 inches of armor. She is therefore a vessel of the first rank, and if liquid fuel can be successfully used on board of her, there is every reason to believe that coal will disappear from the furnaces of the Black Sea fleet. That liquid fuel can be employed on mercantile steamers of large dimensions is a well-known fact. It is regularly used by between 200 and 300 steamers in Russia, according to Mr. Marvin's "England as a Petroleum Power," and some of these vessels are nearly 300 feet long. Over a thousand locomotives and stationary engines in Russia also burn nothing else but liquid fuel. Therefore, it is pretty clear that petroleum makes a useful fuel, and that as a heating agent it has taken a regular place after coal and wood.

On the Caspian Sea the Russian admiralty has used nothing but liquid fuel for its fleet there for the last fifteen years. That fleet, however, consists only of gunboats and small transports. In the Black Sea it has applied liquid fuel to two or three torpedo boats, and latterly some steamers, built at St. Petersburg for the Oxus, have been fitted with petroleum furnaces. The government now seems to consider the time ripe for further developments. The best types of furnaces in use in the Caspian have been called upon to yield collectively the best design for the Tchesme, and in due course the Russian government will solve one way or the other the debated question whether liquid fuel is superior to coal on board men-of-war. The advantages claimed by Russian practice are defined by Mr. Marvin as follows:

"Liquid fuel can be turned on or off like gas, thus dispensing with stoking or banked fires; it is clean and emits no smoke. A ton of liquid fuel can do the work of two or three tons of coal, occupying at the same time, bulk for bulk, about half the space; and this means that either the vessel can go two or three times as far without stopping to coal, or utilize the bunker space for cargo purposes. In this manner, 1,000 tons of oil not only goes as far as 2,500 tons of coal (according to the type of furnace used), but takes up only the bunker space of 500 or 600 tons, and allows the balance of 2,000 tons to be applied to passenger or cargo purposes."

In the case of Russia there is one more advantage which has probably influenced the Minister of Marine more than any of the foregoing—the fact that by using liquid fuel in the Black Sea, Russia will render herself independent of English coal.—*Broad Arrow.*

Theism.

According to the *Journal* of the American Medical Association, attention has recently been drawn to a new nervous disorder, said to be especially prevalent in England and America. It is called "theism," or tea-drinker's disease. It exists in three stages—the acute, subacute, and chronic. At first, the symptoms are congestions of the aphalic vessels, cerebral excitement, and animation of the face. These physiological effects, being constantly provoked, give rise after a while to reaction marked by mental and bodily depression. The tea-drinker becomes impressionable and nervous, pale, subject to cardiac troubles, and seeks relief from these symptoms in a further indulgence in the favorite beverage, which for a time restores him to a sense of well-being. These symptoms characterize the two first stages. In chronic cases, theism is characterized by a grave alteration of the function of the heart, and of the vaso-motors, and by a disturbance of nutrition. The patient becomes subject to hallucinations, nightmares, and nervous trembling. With those who take plenty of exercise, a habitual consumption may often be indulged in with impunity, but with women and young people who follow sedentary occupations this is not the case. The best treatment for theism is said to be indulgence in free exercise, such as walking and open-air life.

Destruction of Building Stones.

Mr. Gobin, a French government engineer at Lyons, addresses the following letter to *La Nature* on one of the causes of the decay of building stones:

"I think I can point out one of the causes of the destruction [of stones] which, as far as I know, has not been noticed, and which acts upon the hardest and most resistant materials, such as granite. This cause is the abrupt expansion produced by the action of the sun when the temperature of the air is very low and the sky is clear. The following are the facts which I have observed, and which justify this opinion:

"At Saint-Pal-de-Mons (Haute-Loire) a granite cross is standing in a public square opposite a church, and the inscription upon it shows that it was set up in 1670.

"The upright portion of the cross is cylindrical, and exhibits a curious phenomenon. The superficial layer of the stone has detached itself circularly from the central part to a depth of about half an inch. A portion of this layer has fallen from half the circumference of the upright, and what remains forms a sort of half-sheath, very distinct from the rest of the mass, so that the whole has the aspect of a fossil tree that has preserved half of its petrified bark.

"As the portion of the envelope that has fallen is found at the south side, we cannot see in this phenomenon an effect of frost solely, but must recognize the fact that it is a consequence of the successive expansions and contractions that have been renewed thousands of times since the cross has been exposed to the sun's rays. I may add that the climate of the country is very cold, on account of the great altitude, and that the air is pure and fogless. The action of the sun in winter, then, must produce great differences in temperature.

"A similar, but less marked, phenomenon is observed upon a granite cross in the village of Joux, near Tarare (Rhone).

"Finally, upon the first granite column on the right side of the chancel of the church of Ainay, at Lyons, is to be seen a superficial slab that has detached itself from the mass, and very likely under similar circumstances. These columns, in fact, came from a Roman temple, and we may conclude from the fact noted above that the one mentioned stood in the interior of the temple at the south side, or else that in the ruins of the temple it was exposed for centuries to the action of the sun."

Tempering Steel with Electricity.

At the shop of the Sedgwick Mainspring Co., 19 and 21 South Canal street, Chicago, can be seen a very interesting application of electricity to the arts. It consists of tempering watch springs by means of the electric current. In one part of the room stands what is known to the trade as a one-light dynamo. The conductors from the dynamo lead to another part of the room, to a bench on which stands an ordinary oil tempering bath. One of the conductors connects with a point within the oil bath, and the other to a point without. The piece of flat soft steel wire that is to be tempered to the blue color is fed under the contact point on the outside of the bath first and then under the one on the inside. When it reaches the latter the circuit is complete, and the wire immediately and uniformly becomes heated. No means have been taken to measure the current exactly for the purpose of doing the whole work mechanically. The variation in the percentage of carbon in different pieces of steel forbids the delicate process of tempering from becoming a purely mechanical piece of work. Therefore, with the electric current as with a fire, the color of the steel determines the length of time that it shall be heated. Several advantages are claimed for this process of tempering. The chief one is that the steel does not have time to oxidize after it has been heated to the proper color before it is under cover of the oil, and consequently that the steel wire is of the same thickness when it is tempered as it was before it entered the process. The heating is uniform throughout the length of the spring, and there is less liability of defective spots. The process is a rapid one, the springs being heated and passing into the bath at the rate of four inches a second.

The large watch-making concerns look with great favor on the new process, and the Sedgwick Mainspring Co. are just about to double their capacity for the purpose of keeping up with their orders.—*West. Electrician.*

To Make Labels Adhere to Tin.

Take of flour six ounces, of molasses one-half a pint, and of water one pint and a half, and boil as usual for flour paste.

Or, dissolve two ounces of resin in one pint of alcohol. After the tin has been coated with the solution, allow nearly all of the alcohol to evaporate before applying the lable.

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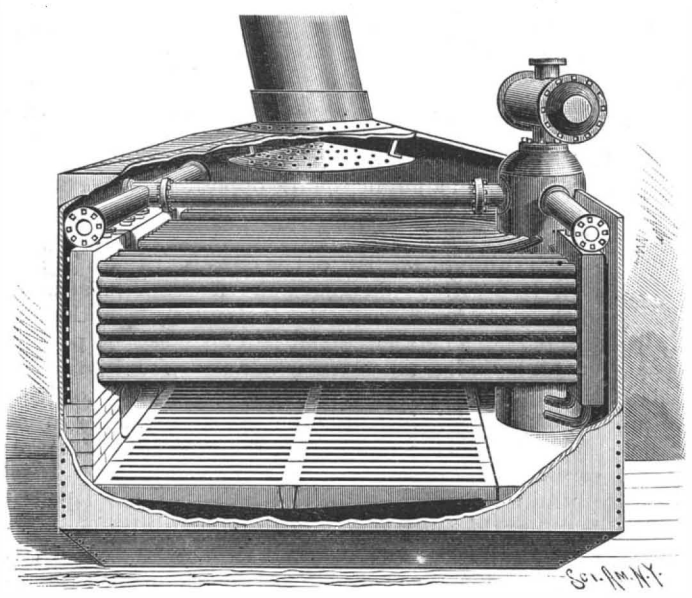
Cement for India Rubber.

The following composition is good for filling the cracks that occur in the rubber belts of band saws, tires of velocipede wheels, and rubber tubing. The sides of the fissure are to be well cleaned, and the following solution to be then introduced:

Sulphide of carbon	5	ounces.
Gutta percha	5	drachms.
India rubber	10	"
Fish glue	2½	"

If the slit is a slightly gaping one, the edges must first be united by a few stitches, and the solution be applied in layers. After the composition has hardened, the threads are removed and the projecting cement is shaved off with a very sharp blade that has previously been dipped in water.—*Revue Industrielle.*



CASWELL'S STEAM BOILER.

AN IMPROVED STEAM BOILER.

A boiler that is designed to generate steam quickly and be very economical in its consumption of fuel is shown herewith, and has been patented by Mr. Charles H. Caswell, of Newport, R. I. Our illustration gives a longitudinal sectional elevation, part of the furnace wall being broken away. The boiler has at its rear an upright cylinder, on the top of which is the steam dome, and this upright cylinder is connected by pipes with rectangular water spaces on either side, and is also connected therewith by the larger pipes extending over the tops of these chambers. At the front of the boiler are also three rectangular water spaces, the ones on either side being connected by pipes with their opposite rear chambers, and the central one being connected with the upright cylinder at the rear, these front chambers being connected with each other by pipes at their sides, and also by larger pipes extending over their tops, from which extends a central pipe connection with the top portion of the large cylinder at the rear. The boiler is fed through pipes opening into the large cylinder near the bottom. With this construction the several connecting tubes and pipes are all exposed to the action of the heat generated on the grate bars of the furnace, giving a very large heating surface, and at the same time establishing a free circulation of water in all the chambers, tubes, pipes, and the upright cylinder. The outer covers of the several chambers are readily removable, to permit of easy access for cleaning the pipes or for other purposes, and a perforated shield is held below the chimney opening to prevent the too rapid escape of the products of combustion.

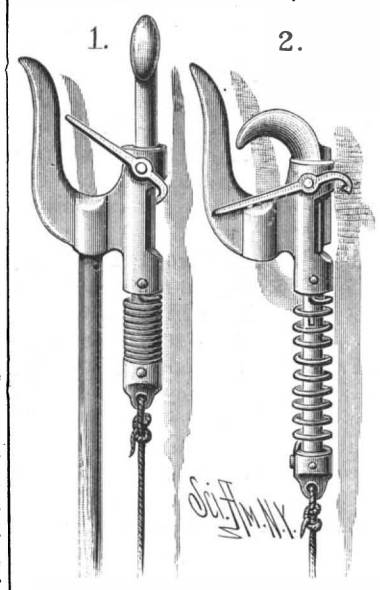
Rights of Inventors and Employers.

The Wisconsin Supreme Court, in the case of the Fuller & Johnson Manufacturing Company *vs.* Bartlett, has rendered a decision of much interest to inventors. It was an action to enforce the specific performance of an alleged implied contract to assign to the plaintiff an invention made by the defendant while in the employ of the plaintiff and before procuring a patent. The court decided that the mere fact that in making an invention an employe uses the materials of his employer, and is aided by the services and suggestions of his co-employes and employer in perfecting and bringing the same into successful use, is insufficient to preclude him from all rights in it as an invention. An implied contract to assign such rights cannot be enforced from the mere passivity of the inventor. It is the conception in the perfected machine, not the materials, workmanship, and skill employed in its construction, which constitutes the invention, and the defendant, as the inventor, was the lawful owner of the invention in his own right.

The above is a question constantly arising between inventors and employers, and patent attorneys are frequently called upon to decide between the parties. This decision will settle a good many disputes.

A DEVICE FOR CATCHING ANIMALS.

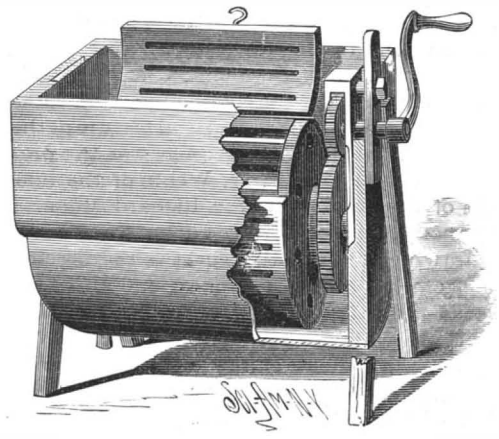
A simple and effective implement for catching sheep, hogs, and other animals by their legs is illustrated herewith, and has been patented by Mr. John Betz, of Jordan, Minn. The device has a fixed and a movable arm, the latter arranged to be pushed forward and turned out of the way, as shown in Fig. 1, but with a spring for turning it and bringing it into engagement with the leg of the animal, in the position indicated by Fig. 2. By pressing the fork forward upon the leg of the animal, a trigger is pushed backward, releasing the spring-held shank of the movable arm, this shank being formed with a feather to fit a slot in the guide arm which holds it, so that the arm turns and the spring draws its hook forward toward the closed end of the fork, securely holding the leg of the animal.



BETZ'S ANIMAL CATCHER.

A SIMPLE AND EFFICIENT WASHING MACHINE.

The invention herewith illustrated provides a machine by which clothes may be washed without any of the ordinary pounding or rubbing, and consequently without injuring the fiber, tearing off buttons, etc. It has been patented by Mr. Hiram Lawrence, of Salem, Oregon. The general features of the washing cylinder, with the narrow open spaces in its periphery and the holes in its heads, with the manner in which it is revolved by the crank handle, will be readily understood from the illustration. The tub has a semi-cylindrical bottom, and in washing clothes with the machine is to be about one-third full of hot suds, the openings in the cylinder permitting the water also to be at the same height therein. Longitudinal bars are fixed along the inner walls of the cylinder, and these, as the cylinder is revolved, carry the clothes up on the side and drop them over again upon themselves and into the suds, thus keeping up a constant agitation and stirring up of the contents of the cylinder. The clothes are put in through the hinged door making part of the periphery of the cylinder, and the latter is hung in movable bearings, by which it may be adjusted at the desired height in the tub, which is closed by a cover to confine the heat and steam.

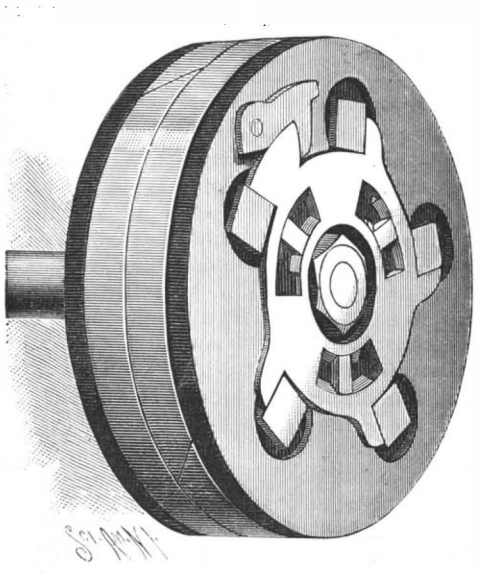


LAWRENCE'S WASHING MACHINE.

IMPROVED BOLT LOCK FOR PISTON HEADS.

For pistons of engine cylinders of the usual construction, in which the several parts of the piston head are held together by bolts, the invention herewith illustrated provides an improved lock to prevent the bolts from becoming loose, and thus injuring the engine. The follower plate may be a fixed part of the piston, or be secured by suitable means on its face, and it has recesses through which project the square heads of the bolts. On the follower plate, inside these recesses, are flat-headed projecting studs, adapted to engage circular grooves or slots on a lock plate, by which the latter may be readily attached to or removed from the follower plate. On the rim of the lock plate are projections corresponding to the number of bolt heads, and adapted to engage one side with their straight edges, one of the projections having an inclined edge on which fits a pawl pivoted on the follower plate. When the several parts of the piston are screwed together, then the lock plate is secured to the follower plate, the studs on the latter entering the grooves or slots of the lock plate, which is turned until the straight edges of its projections come in contact with one side of the bolt heads. The pawl is then driven by the blow of a hammer into contact with the inclined edge of the lock plate, holding the latter in position and preventing the bolts from turning. This improvement has been practically tested, having been in use on a Baldwin locomotive on the Northern Pacific Railway for several thousand miles of service, and showing no strain or wear whatever on plate or studs.

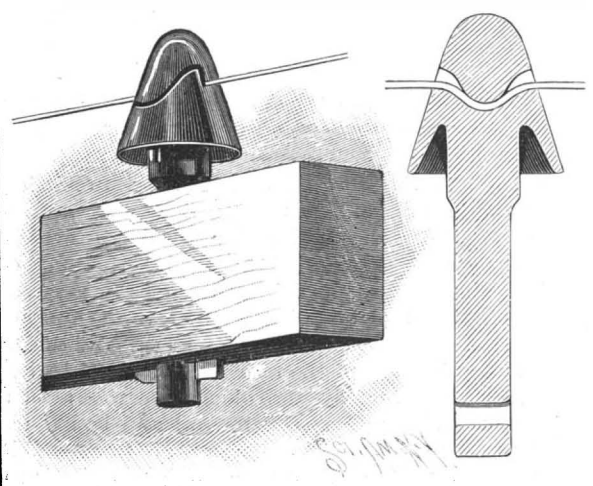
This invention has been patented in the United States and in England. For further information relative thereto, address Joseph Wormald, Sr., Perth Amboy, N. J., or Joseph Wormald, Jr., Missoula, Montana Ter.



WORMALDS' LOCK FOR BOLTS OF PISTONS.

AN IMPROVED INSULATOR FOR ELECTRIC WIRES.

A novel form of "self-tying" insulator for electric wires, to which the wire can be readily and securely fastened, and which will prevent any accumulation of water around the wire, is shown in the accompanying illustration, and has been patented by Mr. Henry K. Ruger, of Bay St. Louis, Hancock County, Miss. It is made of a single piece of glass or other suitable insulating material, and does not require any pin, while the bottoms of the central vertical slots are curved inwardly and downwardly, so that any water or moisture entering will immediately flow out. The curves of the slots, also, are such as to facilitate the quick adjustment and secure holding of the wire. This insulator can be manufactured as cheaply as the usual forms of glass insulator in common use.



RUGER'S INSULATOR FOR ELECTRIC WIRES.

Soldering Cast Iron with Tin.

Many ornamental articles are made of cast iron, variously decorated. The smaller specimens of this kind break very easily if carelessly handled. Then the question arises of how to mend the broken article, a question that has puzzled many, as it is so very hard to firmly unite pieces of cast iron. It is hard to find a simple method, because cast iron has but a slight affinity for tin solder. The soldering can be made much easier by first cleaning the faces of the broken parts from all impurity, which is not necessary when the fracture is of recent occurrence and the broken parts are perfectly clean on their faces. With a brass wire scrubbing brush, the faces of the fracture are continually scrubbed until they finally appear perfectly yellow, thus in a certain sense being "dry plated" with brass; the rough cast iron rubs off brass from the fine wires very quickly. The brazed surfaces are tinned just as brass is tinned, and then with no greater difficulty the parts can be soldered together.—*Der Metallarbeiter.*

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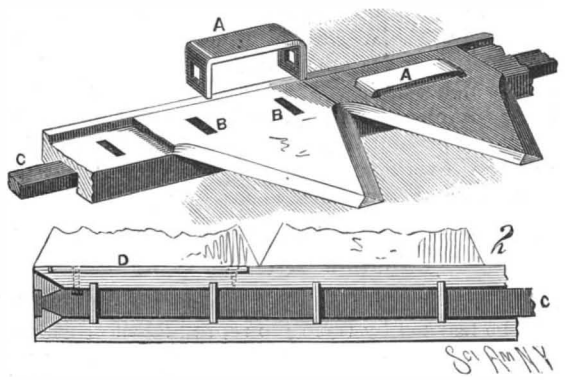
IMPROVED CUTTER BAR FOR MOWERS AND REAPERS.

A device for fastening the cutters on the cutter bars of mowers and reapers, so that the cutters may be quickly removed for grinding and other purposes, is shown in the accompanying illustration, and has been patented by Mr. Wallace B. Comstock, of Allendale Center, Mich. The under side of the cutter bar has a longitudinal groove, into which fits a key, C, and the bar also has vertical slots, corresponding with similar slots, B B, in each cutter, through which pass the side arms of a U-shaped staple, A. The outer end of the key, C, has a notch, into which fits a pin passing through an aperture in the bar, and secured to the free end of a spring, D, fastened to the front edge of the

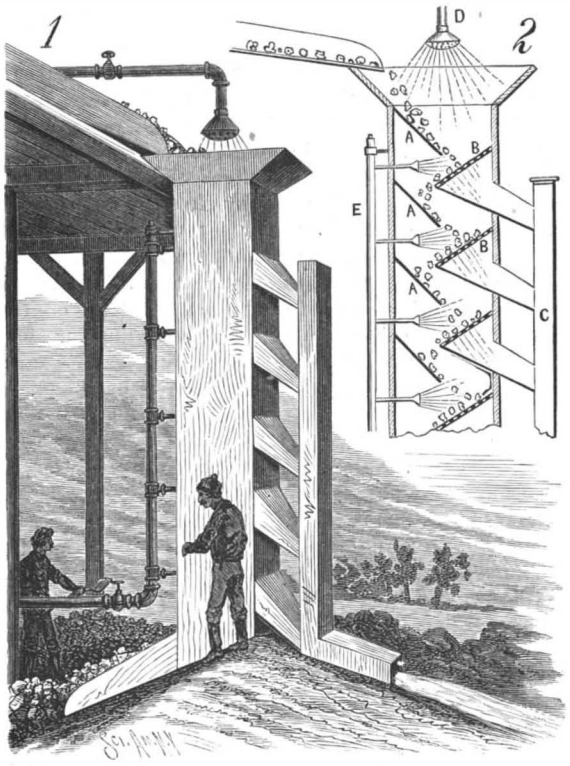


COMSTOCK'S CUTTER BAR.

bar, as shown in Fig. 2, whereby the key is locked in place. The eye, which connects in the usual manner with the devices for imparting motion to the bar, is also fastened to the bar by the key, C, and all the cutters can be readily removed when the key is withdrawn.

AN IMPROVED ROCK WASHING APPARATUS.

A method of cleansing rock from such impurities as sand or mud, previous to pulverizing, is shown in the accompanying illustration, and has been patented by Mr. Oscar W. Donner, of Coosaw, S. C. The rock is delivered through a hopper to a vertical conductor, which has a series of inclined plates or aprons, A,



DONNER'S APPARATUS FOR WASHING ROCK.

and opposite perforated plates, B, the rock falling first upon one and then another of these plates in its passage downward through the conductor. Over the conductor is a rose nozzle, D, which showers water upon the rock, and opposite each of the perforated plates are jets supplied from a stand pipe, E, the water thus sprinkled on the broken rock passing down the conveyer carrying off the refuse matter through the chute, C. The number of the plates, and their inclination and arrangement, may be varied according to the nature of the material to be treated.

Photographs of Lightning Flashes.

Some very perfect photographs of the flashes of "forked lightning" have recently been secured by Mr. W. N. Jennings. Considerable difficulty is naturally experienced in securing exposures of so pre-eminently uncertain a subject. In two instances recently Mr. Jennings has achieved quite a notable success. One of the interesting features of the exposures is the undulatory or wave-like character of the tracing. The zig-zag appearance so often shown in pictures is not present. The general appearance is that of the branch of a tree outlined by the flash. The lines are slightly sinuous, but nowhere of the conventional shape of "artistic lightning."

AN IMPROVED OX BOW.

The invention herewith illustrated provides an ox bow which will not bear upon the windpipe or upon the veins or arteries of the neck, and has been patented by Mr. Luman Rundell, of Grapeville, N. Y. The bow as represented is formed partly of wood and partly of metal, the metal portion being made tubular and forming an enlarged lower part of the bow, which is of sufficient size to relieve the lower part of the throat of the ox from any pressure of the bow. It may, however, be made entirely of wood bent into the form shown, or even of a piece of gas pipe bent into suitable form.

RIPENING OF LIQUORS BY OZONE.

The researches that have been made up to the present with a view of arriving at a process of removing the bad taste of alcoholic liquors and of artificially ageing them, prove how much interest a solution of the problem presents. We have already described the process of Mr. Naudin, which consists in converting into alcohol, through electrolytic hydrogen, the aldehydes that give distillers' wash its bad taste. Other processes consist in oxidizing the alcohol directly by passing through it a current of oxygen or ozonized air. It is on this principle that is based the process that we are about to describe and that is being worked by Messrs. Teillard and Tournous, purchasers of the Broyer and Petit patents.

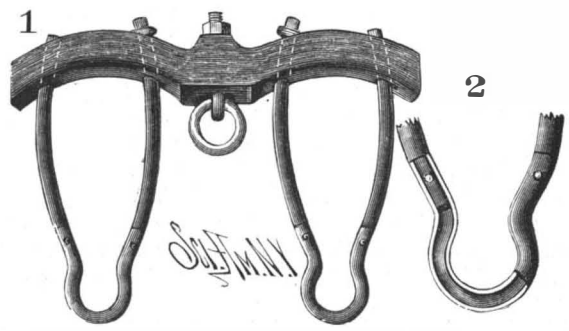
The process consists in the use of very pure and concentrated ozone under pressure, and making it serve several times in succession by regenerating it after each operation.

Ozone, the existence of which was recognized as long ago as 1785, was not really discovered till 1840, and although it has since been studied by eminent chemists, its use in the industries has not hitherto extended much. It is produced by causing an electric current to pass into oxygen, which, as a consequence of this operation, becomes reduced from three volumes to two. It is therefore a strengthened oxygen—an oxide of oxygen—and so has very strong oxidizing properties. All those who have handled plate electric machines or Ruhmkorff coils know its characteristic odor, whence, in fact, is derived it name (ὄζω, 'I smell').

To make ozone, it suffices, then, to bring oxygen into contact with an electric current; but there are certain conditions to be fulfilled in order to obtain the best possible yield. One of the best known apparatus is Mr. Houzeau's, an example of which is shown at the bottom of Fig. 1. It consists of two spirals of aluminum wire isolated from each other by a glass tube, one being wound around the tube and the other being within it. The whole is inclosed in a larger glass tube, into which is passed the current of oxygen that is to be converted into ozone. Each spiral is connected by one of its extremities with a terminal affixed to the outer tube, and which serves to connect it with the source of electricity.

The ozone produced with this simple apparatus would not permit of deodorizing alcohol economically, and so Messrs. Broyer and Petit, in concert with the skillful glass blower Seguy, have arranged it in such a way as to obtain oxygen ozoned to the highest degree possible and to much increase the effect produced. The arrangement adopted is shown at the upper part of Fig. 1. It consists in the use of three tubes like the one just described placed alongside of each other and connected by elbows, and in electrifying each tube separately by means of an induction coil actuated by a pile of two elements. In this way, the oxygen already converted into ozone in the first tube passes into the second and then into the third, and is each time submitted to a new electrification. The induction coils and piles used up to the present are to be replaced by an alternating current dynamo. Each tube will be connected with the general circuit by a special derivation, in such a way that the conditions will be the same as they are at present.

This mode of producing ozone gives remarkable results, and the influence of the three successive electri-



RUNDELL'S OX BOW.

fications may be easily seen by means of the reagent usually employed (terebinthine and tincture of guaiac), which ozone turns blue. If we take the gas coming from the first tube, we obtain a certain coloration that will serve as a starting point. Making the same test with the gas as it comes from the second tube, we find that the color is tenfold deeper; and, finally, on making its exit from the last tube, the color is fifteen times deeper than at first. If the tests be extended still further, we observe hardly any increase in the depth of the color, and it is hence concluded that three tubes are sufficient to allow the gas to give its maximum effect.

The essential oils that give alcohol its bad taste do not resist the action of ozone thus prepared; but in order to obtain a good result it is necessary to pass into the alcoholic liquid at least ten times its bulk of ozone. This represents considerable of an expense, especially when we consider that the oxygen to be converted into ozone must be very pure. In order to obviate this inconvenience and render the method really practical, recourse is had to an ingenious process that consists in the use of the same oxygen several times in succession. In fact, the oxygen is not destroyed by its conversion into ozone, but undergoes a simple transformation—a concentration that gives it new qualities. But it resumes its first form, either after being heated to about 75° or after being utilized in chemical reactions like those under consideration.

Fig. 2, which gives a general view of the Teillard plant, shows how this property has been put to profit. The oxygen is produced in cast iron retorts (not figured) by means of a mixture of chlorate of potash and bin-oxide of manganese, and is purified by passing it

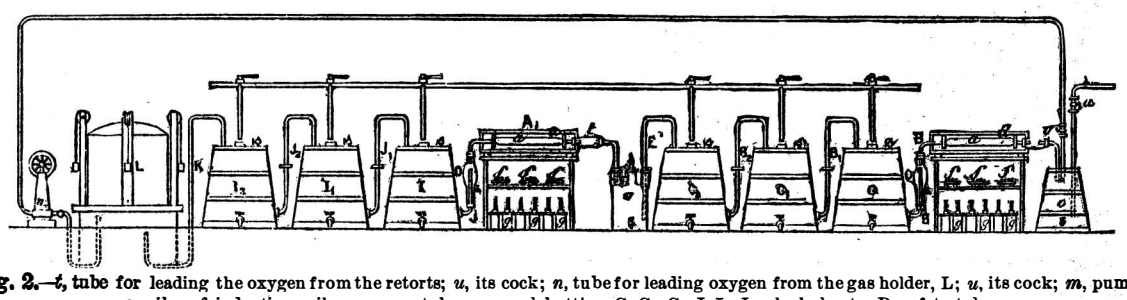


Fig. 2.—*t*, tube for leading the oxygen from the retorts; *u*, its cock; *n*, tube for leading oxygen from the gas holder, L; *u*, its cock; *m*, pump; *g*, piles; *f*, induction coils; *a*, ozone tubes; *o*, wash bottles; C, C_1, C_2, I, I_1, I_2, alcohol vats; D, safety tube.

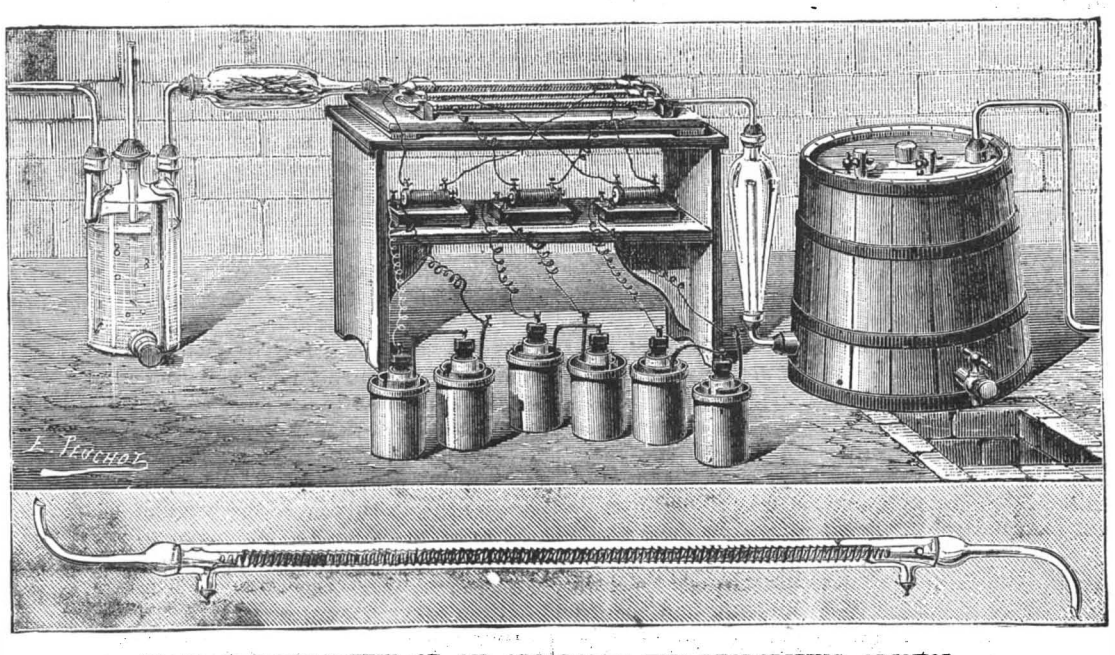


Fig. 1.—GENERAL VIEW OF AN APPARATUS FOR DEODORIZING ALCOHOL.

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through solutions of sulphate of iron and caustic potash. It enters a washer, *o*, under a pressure of three atmospheres, through the tube, *t*, whose cock, *u*, is open, and here becomes cool. It then traverses a pipe filled with caustic potash and enters the tubes, *a*, described above, and therein becomes converted into supersaturated ozone. This latter flows into the first vat, C, filled with alcohol, to be rectified, traverses all the liquid that it contains, and then escapes through a pipe and traverses the vats of alcohol, C and C_2. At this point it has lost the greater part of its properties. On making its exit from vat, C_2, it is no longer supersaturated ozone that escapes from the pipe, but oxygen charged with vapors of alcohol.

This oxygen is freed from the latter in a washbottle containing cold water, is dried in contact with caustic potash, and afterward passes through a second series of apparatus like the others, first being converted into ozone, and then passing into the vats of alcohol. Finally, after meeting with a third series of apparatus, the gas, which has for a third time become oxygen, enters a gasometer, L. When the latter is full, the production of oxygen in the retorts is stopped, the cock of the tube, *t*, is closed, and that of the tube, *n*, is opened. Through a suction and force pump, the gas in the gasometer is sent through the tube, *n*, to the first washing vat, placed in front of the first series, and traverses all the apparatus again.

The operation is thus carried on until the gas is exhausted, this fact being shown by the level of the gasometer, L, which is then filled again by means of the retorts. We have, then, a closed cycle that permits of operating continuously and under economical conditions.

Fig. 1 gives a perspective view and the details of all the apparatus. The gas is supposed to be coming from the left. Between the first vat and the ozone apparatus there is a safety tube for preventing the liquid from entering the latter and breaking it in case a diminution in pressure should occur. The room containing the apparatus is kept at a temperature of less than 15°.

The alcohol treated by this process is perfectly deodorized, whatever be its source, and, on coming from the apparatus, is comparable to spirits that are several years old, thus rendering it fit for the manufacture of cognac.—*La Nature.*

MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, NEW YORK, 1887.

(*Continued from first page.*)

nomic science and statistics, Henry E. Alvord, of Amherst, Mass.; permanent secretary, Frederick W. Putnam, of Cambridge (office, Salem, Mass.); general secretary, William H. Pettee, of Ann Arbor, Mich.; assistant general secretary, J. C. Arthur, of Geneva, N. Y.; treasurer, William Lilly, of Mauch Chunk.

The following are some points of the programme: On Wednesday morning, at 10 o'clock, a general session for organization in the library hall of the college, and in the afternoon addresses by the vice-presidents of the several sections. The retiring president, Professor E. S. Morse, will make an address in the evening. There will be daily meetings of the sections, both morning and afternoon. A general reception will be given in the Metropolitan Opera House, Thursday, at 9 P. M., by the ladies' committee, to members of the association and their families. On Friday afternoon a water party will be given by Mrs. J. S. T. Stranahan, of Brooklyn, including a visit to Governor's Island and other places of interest. In the evening of that day, the Torrey Botanical Club will give a reception. It is proposed to visit West Point on Saturday. There will be a botanical excursion, Monday afternoon, to Sandy Hook; and an evening reception by Mrs. A. B. Stone, at Valentia flats, from 5 to 7; after which the New York Academy of Sciences will welcome the A. A. A. S. at Columbia College, followed by various receptions at private residences. The closing exercises will be on Tuesday evening. An excursion to Long Branch, by ocean steamer, is arranged for the Wednesday after adjournment. Other entertainments have been suggested, viz., a visit to the benevolent institutions on Blackwell's Island; to the American Museum of Natural History; to some of the leading manufacturing establishments of the city, etc. The geological section will visit the trap rocks of Bergen Ridge and inspect the glaciation of the rocks at Central Park. The Entomological Club will meet here on the day prior to the general meeting of the A. A. A. S., and the Agricultural Society will meet Monday and Tuesday.

The fact that the association meets this year in the halls of the Columbia College gives additional interest to engravings showing the exterior of the building on Madison Avenue, "Hamilton Hall;" and the interior of the library, where the general sessions will be held.

Originally chartered, in 1754, as "King's College," this was at first distinctively an Anglican institution. George III. and other noble patrons enabled the governors of the college to "extend their plan of education almost as diffusely] as any college in Europe." The first president was Rev. Samuel Johnson, D.D., of Connecticut. For several years the recitations were heard in the vestry room of Trinity Church. The corporation of that church granted land to the institution between Broadway and the Hudson River, a portion of which was immediately, and for a hundred years, used for college buildings, while the remainder was leased, the rentals yielding a large income. During the revolutionary war the property was used as barracks for soldiers, the library was scattered, and the affairs of the college broken up. The legislature of New York, recreating the institution in 1784, perfected its charter in 1787, under the present title of "Columbia College." Thus this is its centennial year—an event enthusiastically celebrated last April, and of which this scientific assembly will be also a fitting commemoration. In 1814 the legislature granted the college a tract of twenty acres, then valued at $5,000, and located, on the present map of the city, between Fifth and Sixth Avenues and from 47th to 51st Street. It was not, however, until 1857 that the requirements of commerce made it necessary for the college to be removed from College Place to its present location, where it occupies the block bounded by 49th and 50th Streets and Fourth and Madison Avenues.

The range of academic instruction has been greatly enlarged, until now what is called the School of Arts includes, besides the usual curriculum, numerous optional studies. There are also several associated schools clustered around this as a nucleus, some of which are famous, while all are useful. These are a School of Mines, a School of Law, a School of Political Science, a School of Library Economy, and a School of Medicine. The School of Mines was established in 1864, prior to which there was no college in the country where mining was taught as a science. It grew from its original design until now it includes seven parallel courses of study, each occupying four years, and no two of which a student is allowed to pursue at once. These courses are mining engineering, civil engineering, metallurgy, geology and paleontology, analytical and applied chemistry, architecture, and sanitary engineering. Thus it might more appropriately be styled "The School of Applied Sciences." A highly interesting portion of its work is done by means of "summer classes," which meet in widely different localities. *E. g.*, in 1886, one class met in Northern Michigan, to study practical methods of mining; another for practical surveying, near Litchfield, Conn.; another for studying geodesy, near Otsego Lake; another had its headquarters at the Delamater Iron Works, on the North River; while the class in chemistry stays in the laboratories of the university. The School of Library Economy is an original feature, introduced this year, expressly to meet the wants of young persons of literary tastes wishing to study bibliography and the best methods of selecting, buying, arranging and caring for libraries, and making their contents useful and available for readers.

The Columbia College Library itself has been recently reorganized, and with the most modern appliances. The building in which it is contained, with its equipment, cost over $400,000; and such is the rapid accumulation of literary treasures that the trustees suggest an enlargement involving an expenditure of about a quarter of a million of dollars. The School of Law and astronomical observatory are also accommodated in this building. The building for the School of Mines was erected in 1874, at a cost of $150,000. Hamilton Hall, built in 1879, with a frontage of 200 feet on Madison Avenue, and a depth of 60 feet, shown in our engraving, was completed at a cost of about $200,000, for the School of Arts. The School of Medicine had this year 606 students, and moves this summer into its new building on 59th and 60th Streets, the munificent gift of the late Wm. H. Vanderbilt.

The chemical museum is rich in several thousand specimens to illustrate that department. The lithological cabinet contains about 5,000 rocks and minerals. The collection illustrating historical geology includes 75,000 specimens. The paleontological series includes thousands of recent and fossil animals and plants. The botanical collection has 60,000 species represented, and is peculiarly rich in "type specimens." There are also models, casts, specimens of building materials, ores, clays, coals, etc.

The faculty of this great university includes a president and one hundred and eighty professors, instructors, and assistants, and it has, according to President Barnard's statement, 1,602 students in all its departments. Such an array may well command the public attention, even amid the noise and rush of a commercial metropolis, that is by many supposed to be unfavorable to the calm pursuits of an intellectual life. The wealthy men of New York City would do wisely to increase the already large resources of Columbia College, so as to enable its managers to carry out fully and in the most attractive manner possible all their praiseworthy projects.

ELECTRICITY under favorable circumstances has been found to travel at the rate of 288,000 miles per second.

Northern Pacific Railway.

This company has now a continuous line from St. Paul and Duluth to Tacoma, on Puget Sound, the switchback over the Cascade Mountains having just been completed. The distance from St. Paul to Tacoma is 1,937 miles, which is a saving of 124 miles over the present route by way of Portland, Ore. As the Northern Pacific owns the line from Tacoma south to Portland—145 miles—it also has its own track from St. Paul to the latter city, and the distance by this route to Portland—2,082 miles—is only 25 miles longer than the present route, using the tracks of the Oregon Railway and Navigation Co. from Wallula Junction to Portland, a distance of 222 miles. The Northern Pacific Company, therefore, has completed its long entertained hope of owning a continuous line from Lake Superior and the Mississippi to the waters of the Pacific. The great Stampede tunnel through the Cascade range, which will take the place of the switchback, is to be completed in May, 1888, and will considerably shorten the present line. Its length will be 9,880 feet, while the overhead line of switchback requires a length of about four miles to cross the mountains.

Imitation Meteoric Iron.

It appeared to me that some interesting information might be learned by trying to reproduce meteoric iron artificially. I therefore melted together in proper proportions the iron, nickel, and other constituents of the Toluca iron. The furnace was left to go out very gradually, to insure, if possible, slow crystallization. The product is about as unlike meteoric iron as it is unlike ordinary cast metal. It is easy to see that the iron crystallized on solidification in feathery crystals, somewhat like those in some kinds of cast iron, but beyond that similarity ceases. In thus crystallizing, a harder substance was thrown off to the bounding surfaces, but it is impossible to say that it is true schreibersite. On examining the detail, the crystals constituting the chief bulk are seen to have a structure which may be called Widmanstätten figuring on a very small scale, when magnified about 60 linear looking like some etched meteoric iron unmagnified. Taking, however, all into consideration, the structure is very unlike the Toluca or any other meteoric iron which I have examined. It is, however, very interesting to find that apparently no recrystallization took place on cooling, since, unlike what is seen in cast steel, the structure on a small scale seems to be the true structure of the larger crystals. Possibly this relative permanence may depend on the difference in chemical composition. It seemed desirable to try the effect of long continued heat, but at a temperature much below the fusing point of this alloy. In making such experiments, even in well-covered crucibles, one cannot but suspect the influence of carbon introduced from the fuel, even if there is no decided proof of its action. The change produced by keeping a portion of the alloy for some hours at a high temperature was very great. I must say I expected that the effect would have been to have made the structure more like that of normal meteoric iron, but, to my surprise, I found it more unlike than before, and nearly all trace of the minute Widmanstätten figuring lost. If there is any analogy between its structure and that of any meteoric irons, it is with those which have undergone recrystallization, since the whole mass consists of interposing granular crystals of two different characters, whose size varies in relation to the original feathery crystals, the former existence of which is thus well shown, though their structure is entirely changed.

I do not think this single series of experiments sufficiently conclusive to enable us to build on them any important deductions; but, at all events, they serve to show that much might be learned by further experiment with such alloys, of equally great interest in connection with meteoric and artificial irons, since the presence of foreign constituents manifestly alters the mechanical construction very materially. It may perhaps, however, be allowable to draw one provisional conclusion. When solidifying from a state of fusion, the constituents of the complex alloy appear not to have had sufficient time to separate completely, but were able to separate when the product was kept a long time at a high temperature, crystallizing as small grains of at least two different kinds, with no special orientation. There is no evidence of such a separation in the case of meteoric irons, like that from Ruff's Mountain, the original large crystals having merely broken up into a mass of small. Though fully conscious how much more experiment is necessary, I must say that the general tendency of what is now known is to lead us to believe that the present crystalline structure of normal meteoric iron was developed at a temperature much below that of fusion, even though the material may have been previously melted. That very profound changes can quickly take place in iron, merely somewhat softened by heat, admits of no sort of doubt, and further research may prove that similar great changes may take place at no very high temperature, when the time of action is indefinitely long.—*Dr. H. C. Sorby.*

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Correspondence.

Military Uses of Dogs.

To the Editor of the Scientific American:

In your issue of SCIENTIFIC AMERICAN of July 16, I found a notice on the military dogs now to be used with German hunter battalions (Jaeger Battalione, which, each 1,000 men strong, are recruited only from professional foresters and gamekeepers). I see that there have been given some exhibitions in honor of Colonel Von der Goltz Pasha.

Now, that is all right so far as theory is concerned, but as a patriotic citizen of this glorious country, I think you will feel pleased if you hear of an episode that will put us ahead of them by several pegs, namely, by successful practice.

In 1874 or 1875 a detail of soldiers, to be gone for several days, was sent from Fort Sill, Indian Territory, down the Cache Creek, to cut timber for some building purposes. The party was the next day jumped on by Kiowa and Comanche Indians, and completely surrounded. After several charges the Indians gave the soldiers more rest, but kept them so close that nobody dared to steal through to bring help from Fort Sill, and so matters stood for several days. As is usually the case in those kind of expeditions, there were several dogs with the party, mostly of the "yaller cur" kind. One of the soldiers had the idea of fastening a tin can, with a message by the officer in charge, telling how matters stood, to the tail of one of the dogs and chasing him home. This was done in the evening, and as the dog neared the Indians they fired at him, but seeing the tin can pounding the air, they thought it great fun, and yelled and chased the poor dog still faster. The animal arrived at the fort nearly dead, and went to the company quarters. Luckily a kind-hearted soldier tried to relieve the poor brute. In so doing he noticed the slip of paper in the tin can, and raised the alarm. In a short time the commanding officer was notified, and several companies on horseback went to the rescue of the beleaguered party. The Indians saw them coming, and fled. Further details of that fight and rescue, which is highly interesting, are told in a report to the Headquarters, Department of the Missouri, General Jno. Pope being then in command.

At that time I was chief draughtsman and assistant to the chief engineer of the department. This case was much talked of, but it was recommended to carry the dispatch on the dog's neck, and the tin can on the tail for motive power only. ADO HUNNIUS.

Leavenworth, Kan.

Solid Bromine.

Under this name Franke has introduced a preparation of bromine which will find many uses among chemists and manufacturers as a convenient source of bromine. It consists of sticks of kieselguhr made in the solid form by fritting the material with a small quantity of alkali, and then saturating the porous substance obtained with bromine. The thinner sticks (7 mm. diameter) contain about one grain of bromine in a length of 1 cm., while the larger ones (15 mm. diameter) hold nearly 3 grammes. Bromine can be used in a great many cases with advantage as a substitute for chlorine, and this preparation will be found not only cheaper in laboratory experiments, but also time saving, as by its employment is avoided the labor involved in setting up a chlorine-generating apparatus. For the decomposition of sulphur ores, such as copper pyrites and fahlore, its use possesses very decided advantages over the older methods. The sticks should be placed in a combustion tube closed at one end, and holding a boat containing a weighed portion (1 grm.) of the mineral, and connected with two U tubes or receivers filled with hydrochloric acid. On heating the sticks bromine is expelled, and when all the air has been replaced by the bromine, the boat containing the ore is heated. Arsenic, sulphur, mercury, and a portion of the iron present will pass over as bromine compounds with the excess of bromine to the receivers, while the remaining metals will remain in the boat as bromides. Excess of bromine can be prevented from passing into the air of the room by connecting the end receiver with a bottle containing wood shavings moistened with alcohol, or by leading the exit tube into the open air or draught cupboard. When the operation is completed, or in about half an hour, the tube is cooled and then cut between the boat and the bromine sticks. The bromides are then washed into a large vessel and filtered, when the soluble and volatile ones will be in the filtrate with excess of bromine, which is subsequently removed by gently warming the solution. The insoluble bromides on the filter can be made and analyzed in the ordinary way. A mixture of metallic bromides and bromates is also being manufactured as a source of bromine. The chief use of this latter preparation is for bleaching and disinfecting purposes. Some mineral acid has, of course, to be added before any of the bromine is liberated, so that the mixture can be kept for any length of time without any disagreeable results from the escape of free bromine taking place.—*Industries.*

Natural History Notes.

Multiplication of Aphides.—Perhaps no more striking illustration of the wonderful reproductive power of certain insects could be given than that contained in a work recently published by Theodore Wood, an English entomologist. It is assumed, first, that 100 aphides weigh no more, collectively, than a single grain; and, second, that only a very stout man can weigh as much as 2,000,000 grains. Then it is found that if multiplication were entirely unchecked, the tenth brood alone of the descendants of a single aphis would be equivalent, in point of actual matter, to more than 500,000,000 very stout men, or one-third of the human population of the globe, supposing each person to weigh 280 pounds.

Optical Properties of Mosses.—Recent observations have shown that the peristome of some mosses possess curious optical properties. According to Mr. M. J. Aumann (*Annals and Mag. Nat. His.*), sometimes the outer layer of the peristome and sometimes the inner layer rotates the plane of polarization, and exhibits, when a thin plate of mica or selenite is interposed, very brilliant colors, varying with the position of the two nicols relatively to each other. In the Grimmiaceæ and Dieranaceæ this action is feeble; in the Pottiaceæ and Weissieæ, almost *nil;* and strong in Mniaceæ and Hypuaceæ. There exists a curious relation between these optical properties and the amount of tannin contained in these membranes, the endostome of *Camptothecium lutescens* affording a particularly good illustration of this fact.

The Alleged Suicide of Scorpions.—Professor A. G. Bourne has made a number of experiments on three species of scorpions found at Madras, with the object of determining whether the popular notion that scorpions can commit suicide is true. He finds that it is undoubtedly physically impossible for a scorpion to sting itself in a vulnerable place, and when one is placed in very unpleasant circumstances, it not unfrequently lashes its tail about and causes actual penetration of the sting. But the poison of a scorpion is quite powerless to kill the same individual or another of the same or even of another species. Two scorpions, when fighting, repeatedly sting one another with little, if any, effect, the stronger killing the weaker by tearing it to pieces. The poison may be pressed out of the sting with the fingers or a pair of forceps, when it is found to be a milky white fluid with a very pungent smell resembling that of formic acid.

Strength of Snails.—Mr. E. Sanford has found that a snail weighing one-quarter of an ounce can drag up vertically a load of two ounces and a quarter. Another snail one-third of an ounce in weight carried horizontally a weight of seventeen ounces.

Prehistoric Plants.—In his address to the Biological Section of the British Association, Mr. Carruthers described the wonderful state of preservation of the flowers obtained by Dr. Schweinfurth from mummy wrappings in Egypt, even so evanescent colors as the violet of the larkspur and knapweed and the scarlet of the poppy, the chlorophyl remains in the leaves, and the sugar in the pulp of the raisins being preserved. The remains of 59 species of flowering plants have been identified.

In stratified clays resting upon the bowlder clay in the valley of the Nile have been found the remains of 2 species of desmids, 31 of diatoms, and 9 of flowering plants, all belonging to the existing agrarian flora. In another locality, 51 species of mosses have been determined with certainty, a considerable portion being alpine plants, one of them no longer found in Britain. These beds contain also 7 species of seaweeds now found in our seas.

The sedimentary deposits at Cromer, of later date than the Pliocene strata, are the earliest in which remains of plants have been found that can certainly be identified with species existing at the present time. Some of the plant remains from Tertiary strata have been referred to still living species, but, as Mr. Carruthers thinks, without sufficient evidence.

Colored Leaves.—From an examination of the anatomical structure of a large number of colored and variegated leaves, and of the physiological properties of their pigments, Dr. C. Hassack concludes that the white color in variegated leaves results from the absence of pigment in the tissues and the presence of numerous interstices filled with air between the cells. The reflection of light from the numerous air bubbles in them causes the parts of the leaf which are really colorless to appear white. In leaves with yellow variegation, the normal chlorophyl is replaced by xanthophyl, which colors light yellow the protoplasm collected into irregular parietal lumps, and occurs also in the form of minute granules. The gray green which often appears in colored leaves is caused by white layers of tissue, which lie above the green parts of the cells, and partially obscure their color. Silver white spots on leaves with a metallic shimmer are the result of an entire reflection of the light from large shallow air cavities, which stretch between the colorless and the green layers of tissue in a direction parallel with the surface of the leaf. Red and brown tints are caused by the presence of anthocyan dissolved in the cell sap, partly in the epidermis only, partly in the parenchyma only, and partly in both tissues. The various tints depend upon the intensity of the color and the concurrence of red cells with green, yellow, or white portions of the tissue. A papillose structure of the epidermis, peculiar trichanes, or, in a few cases, a wavy structure of the entire leaf, is the cause of the velvety sheen of many leaves; the apices of the papillæ have the effect of bright points on a dark ground, the light being reflected from them in one direction only, while their lateral surfaces scatter light.

While albinism is the result of degeneracy, Dr. Hassack regards a red color as a direct consequence of light, and as a contrivance to protect leaves from the destructive action of too strong light on the chlorophyl, and too strong respiration; it is hence found especially in young leaves, or in the leaves of those plants which grow in very high altitudes or in very cold ones.

Genetic Affinity of Algæ.—In a paper read at the Linnean Society on March 3, on "The Genetic Affinities of the Algæ," Mr. A. W. Bennett suggested that in many of the groups difficult to classify retrogression had apparently taken place in the form of suppression of development of either the vegetative or reproductive organs, the organs which predominated leaving the others degenerate. Thus the desmids are considered to be a degenerate group, which should not be classed as hitherto with the diatoms. The views expressed in the paper are, however, likely to be critically discussed by Continental cryptogamists.

Probably the Oldest Man Now Living.

James James, a negro, and citizen of the United States, who resides at Santa Rosa, Mexico, is probably the oldest man on earth. He was born near Dorchester, S. C., in 1752, and while an infant was removed to Medway River, Ga., in the same year that Franklin brought down electricity from the thunder clouds. In 1772 there was quite an immigration into South Carolina, and his master, James James (from whom he takes his name), moved near Charleston, S. C., in company with a number of his neighbors. On June 4, 1776, when twenty-four years of age, a large British fleet, under Sir Peter Parker, arrived off Charleston. The citizens had erected a palmetto wood fort on Sullivan's Island, with twenty-six guns, manned by 500 troops under Colonel Moultrie, and on June 28 the British made an attack by land and water, and were compelled to withdraw after a ten hours' conflict. It was during this fight that Sergeant Jasper distinguished himself by replacing the flag, which had been shot away upon the bastion, on a new staff. His master, James James, manned one of the guns in this fight, and Jim, the subject of this sketch, and four other slaves were employed around the fort as general laborers. Jim followed his master throughout the war, and was with General Moultrie at Port Royal, S. C., February 3, 1779, when Moultrie defeated the combined British forces of Prevost and Campbell. His master was surrendered by General Lincoln at Charleston, S. C., on February 12, 1780, to the British forces, and this ends Jim's military career.

He remembers of the rejoicing in 1792 throughout the country in consequence of Washington's election to the presidency, he then being forty years of age. In this year his first master died, age about sixty years. Jim then became the property of "Marse Henry" (Henry James), owning large estates and about thirty slaves, near Charleston. On account of having raised "Marse Henry," Jim was a special favorite with his master and was allowed to do as he chose. His second master, Henry, died in 1815, about fifty-five years of age, and Jim, now sixty-three years of age, became the property of James James, Henry's second son. In 1833 the railroad from Charleston to Savannah was completed, then the longest railroad in the world, and Jim, with his master, took a trip over the road, and was shown special favors on account of his age, now eighty-one. James James was ten years of age at his father's death, and when he became of age inherited large estates, slaves, etc., among whom were "old Uncle Jim" and his family. James James lived in South Carolina until 1855, when he moved to Texas with all his slaves. James desired that his slaves should be free at his death, and in 1858 moved into Mexico, so that they could be free before his death. James returned to the United States and died in Texas, and in 1865, after there were no longer slaves in the United States, Uncle Jim's children and grandchildren returned to the United States. Five years ago, at the age of 130, Jim could do light chores, but subsisted mostly by contributions from the citizens; but for the past two years, not being able to walk, he remains for the most part in his little jacal, his wants being supplied by generous neighbors. The rheumatism in his legs prevents him from walking, but yet he has sufficient strength in his arms to drag himself a short distance—fifty yards or more—and readily took a position on the outside of his cabin to enable the *Globe-Democrat* correspondent to make his photograph.—*Laredo, Tex., letter to the St. Louis Globe-Democrat.*

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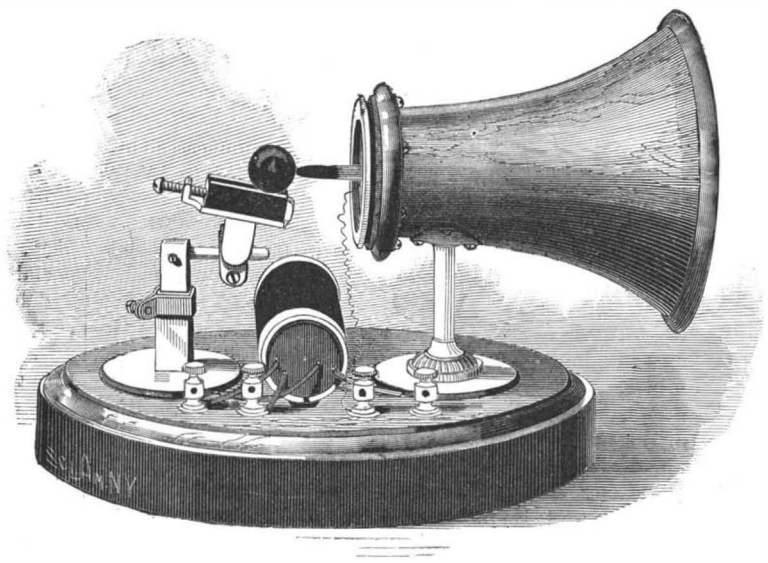
THE BONTA TELEPHONE.

The great Bell telephone patents of 1876 and 1877 are, as is well known to our readers, based upon the theory of the "undulatory current." Substantially the claim is made that speech in all electric telephones is transmitted by a current that is not intermittent or pulsatory, but is continuously undulatory and varies in strength. The wave line representing such a current, as far as its speaking function is concerned, is an unbroken one. This does not imply that there must be no cessation of current. A current that shifts from a maximum in one direction, as from right to left, through zero or total absence of current, to a maximum in the other direction, as from left to right, is considered a continuous undulatory current. This is necessarily the version of the owners of the Bell patents, as precisely such a current, the so-called "shuttle current," is used on their system, as adopted in practical use. The point is, that though there is an infinitely short period of rest, the transition to and from this point is gradual, and is represented by an unbroken portion of an undulating line.

Speech is assumed to be transmitted by a current of this nature. A "make and break" current, it is said by the Bell advocates, cannot of itself transmit speech. The logical deduction is that in telephoning, a perpetual control of the receiving diaphragm is preserved over it by the sending one. Both are assumed to move in unison, and only as the current crosses the zero line, changing in direction, is the distant diaphragm released from control, and then only for an infinitely short period.

The current as used in practice is assumed to be represented by an undulating line crossing as its median a straight line representing the trace of zero or no current. The current goes in one direction as the transmitting diaphragm recedes from, and in the other direction as it approaches the speaker. But it is probable that this reversal of the polarity of the current does not affect the receiving diaphragm, and that the latter is pulled by both impulses of the current, whether positive or negative, as regards the zero base line. The distinction between the undulatory and the pulsatory currents is very sharply drawn in the specification of the Bell patents. From what has been said, it will be clear that the conception of an undulatory current and of its actions is a shadowy thing at best. It is rather a matter for scientists to theorize over than for practical workers to busy themselves with. Yet in a series of very remarkable court decisions it has been made the basis of the most valuable patent right that this country has ever seen.

The telephone shown in the cuts accompanying this article is presented by its inventor, Mr. J. W. Bonta, and proprietors, the American National Telephone Company, of this city, as an apparatus by which speech is electrically transmitted by a pulsatory or a make-and-break current. The essential parts consist of a transmitting diaphragm, to whose back a pencil or rod of carbon is attached, which projects from its center.

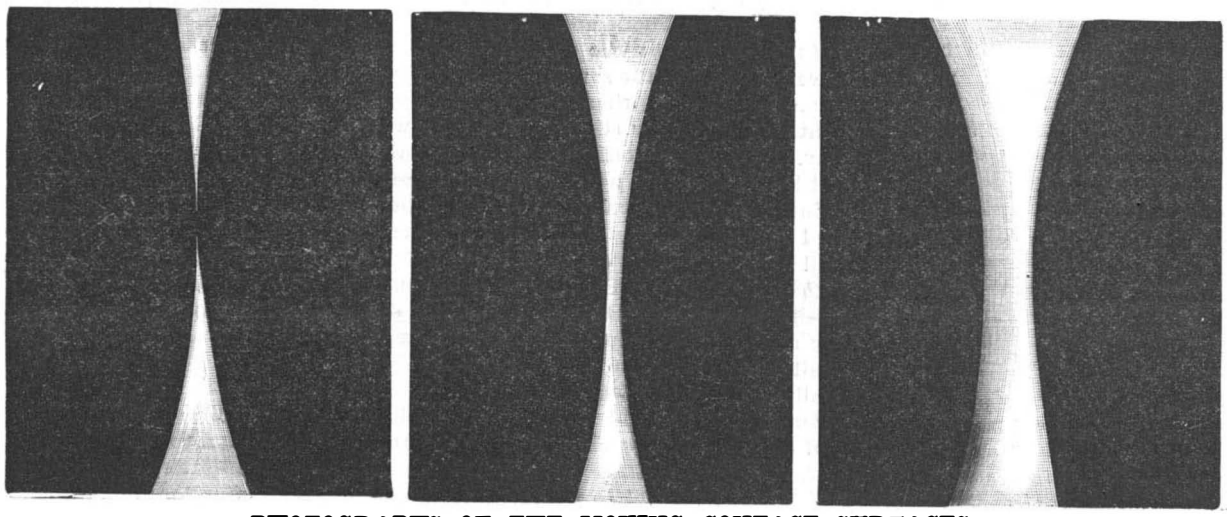


THE BONTA TELEPHONE.

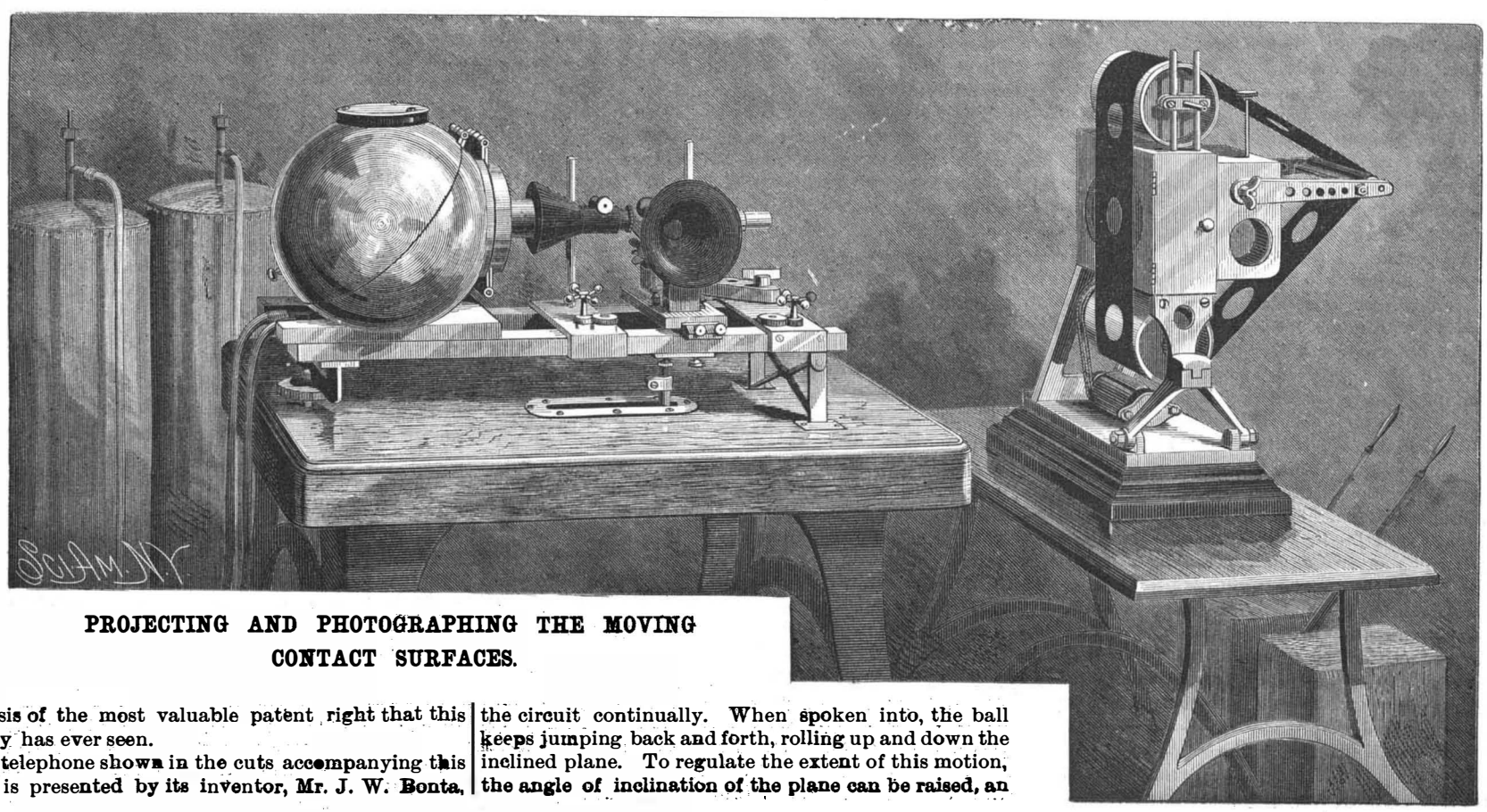
Against the end of this rod a ball of carbon, free to move back and forth in a groove, rests in contact. The groove is formed in a block of carbon, and may, by special adjustment, be more or less inclined. The groove and projecting rod of carbon lie in the same vertical plane. One of the terminals of the circuit connects with the rod, the other with the grooved block. The whole combination forms the transmitting mechanism in connection necessarily with a battery. For use it is connected in circuit with a magneto receiving instrument. When spoken into, the voice is transmitted with great clearness and delicacy. It is exceedingly sensitive. The speaker may stand off several feet, with his back turned to it, and it will still transmit all his words. Its distinguishing peculiarity is that it breaks the circuit continually. When spoken into, the ball keeps jumping back and forth, rolling up and down the inclined plane. To regulate the extent of this motion, the angle of inclination of the plane can be raised, an adjustment, which is shown in the cut, being provided for this end.

As we have seen, the Bell patent is built on a theory, and, strange as it may appear, has been repeatedly sustained on such a basis by the courts. The inventor of this telephone, Mr. J. W. Bonta, has taken the bull by the horns, and has also secured a patent based on a theory. He claims that in the telephone we are describing the intermittent current is used, and not the undulatory. Availing himself of the declarations in Bell's specifications that the undulatory current differs from the pulsatory, which declarations amount to a disclaimer, he declares that his instrument works by the pulsatory current. He asserts that it speaks by the succession of currents of uniform intensity and variable duration, and that their varying duration causes the reproduction of the sound.

In order to illustrate at once and prove his points, Mr. Bonta arranged the apparatus shown in the larger cut. A magic lantern, with microscopic attachment, is set up, and as the object has the pencil and ball electrodes of the telephone in its field, these are projected on a screen as large as may be desired. If now some one speaks into the instrument, the image of the ball is seen to jump back and forth from the pencil electrode, as it opens or breaks the circuit continually. To investigate it still more accurately, a roll of sensitized paper is arranged to continuously rotate in the field of the projected image. In front of the paper, one side of an endless band passes, which band is kept in very rapid rotation. In the band are numerous apertures. This arrangement works like a series of shutters, bringing about a number of short exposures. The movements of the bands are effected by an electric motor, driven by a C. and C. battery. The photographs show the contact points greatly magnified. They appear in every condition of separation or contact. The exposures are at very short intervals, as the band is rapidly rotated, and may run up to a large number per second. In a series of consecutive views, the electrodes are shown for the most part separated, proving that this phenomenon is not only an occasional one, but that it is repeated as long as the apparatus is at work. As a further test, a spring was made to press lightly against the ball. This kept the electrodes in permanent contact, but the telephone would not talk. This was taken as proving that a make-and-break action was essential to its operativeness. The point is also made that spring action interferes with the regularity of the makes and breaks, which regularity is essential. The apparatus for producing the



PHOTOGRAPHS OF THE MOVING CONTACT SURFACES.



PROJECTING AND PHOTOGRAPHING THE MOVING CONTACT SURFACES.

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separate exposures is shown in the right hand of the cut.

The proof is not, of course, a complete one. To make it such would involve an exceedingly difficult piece of photographic work, as from one hundred exposures per second upward would have to be effected. Enough has been shown to prove that a great deal of separation does take place, and that the electrodes are continually driven apart. The position of the Bonta patent in the light of the Bell claims is interesting, as it claims to utilize the disclaimed pulsatory current, thus dividing the field of telephony between itself and the Bell patent. It is not saying too much to assert that its theory is as good as that of the Bell specification.

EDWARD SYLVESTER MORSE.

BY MARCUS BENJAMIN.

The names of two men stand out pre-eminent in the history of the United States as having inspired the study of science. The elder Silliman made possible the wonderful strides achieved in the physical sciences, while the impetus given to the natural sciences received its greatest impulse from Louis Agassiz.

Among those who came to follow the lectures of the latter at Cambridge was Edward S. Morse, the retiring president of the American Association for the Advancement of Science, who has attained a high rank among that group of naturalists who sought knowledge from the most distinguished of modern scientists.

Professor Morse is of New England ancestry, and was born in Portland, Me., on June 18, 1838. His early education was acquired at schools in the city, and later he attended the Academy in Bethel, Me., but like many others, the beauties of nature were more attractive to him than the study of Latin or Greek.

At the age of thirteen he began systematically to collect minerals and shells. Indeed, the latter were probably the starting point of those valuable researches in biology which he has since contributed to science.

Yielding to his fondness for natural science, he entered the Lawrence Scientific School of Harvard, in 1859, devoting special attention to the subjects taught by Louis Agassiz, likewise attending the lecture of Jeffries Wyman in comparative anatomy and archæology, with whom he also visited and explored the mound heaps of a prehistoric people situated in New England. He also followed the lectures on chemistry by Josiah P. Cooke, and those on literature by James Russell Lowell.

His early fondness for shells had not been without profit, for from the knowledge now acquired he presented his first paper, on a "Description of New Species of Helix" (Helix asteriscus),* to the Boston Society of Natural History in 1857. This he followed with a second description† of another species (Helix milium), two years later.

During the years 1859–62 he was assistant to Professor Agassiz, and at that time began his special study of the brachiopods, which, although of a low animal type, have a range in time, geographical distribution, and depth of water more extensive than any other class of marine bivalves. He published in 1862 his first contribution to the literature of that subject, entitled "The Haemal and Neural Regions of Brachipoda."‡ This subject he continued to study for many years and with indefatigable industry, going deeply into the question of their structure and affinities. By the help of embryological analysis, he has thrown new and important light upon their systematic position in the scheme of invertebrate life. They had long been classed as belonging to the mollusks, but after careful researches involving dredgings all along the Atlantic coast, Professor Morse announced his belief in their annelidan nature, placing them among the worms.

Charles Darwin and other eminent naturalists encouraged him in his work, and although he was the first to accumulate evidence for the demonstration of his belief, he was anticipated in its announcement by Japetus Steenstrup, the Danish naturalist.

His most comprehensive paper on this subject is "On the Systematic Position of the Brachipoda,"§ published in 1873, and dedicated to Professor Steenstrup. It covers the entire group and embraces the results of other studies made by him and contributed elsewhere.

Previous to this however he had been busy with other work, and in 1864 he contributed to the Portland Society of Natural History, "Observations on the Terrestrial Pulmonifera of Maine, including a catalogue of all the species of terrestrial and fluviatile mollusca known to inhabit the State." This pamphlet of some sixty pages includes upward of one hundred illustrations drawn by himself, and nearly all of his papers contain sketches of his own making.

Before this time he held the office of mechanical draughtsman in the locomotive works at Portland, and later he was engaged in Boston, preparing illustrations on blocks for wood engravers. In this manner he acquired the habit of sketching with striking rapidity and minute exactness, and he possesses, moreover, the additional power of being able to draw equally well with either hand. This accomplishment has been of inestimable value in his scientific work.

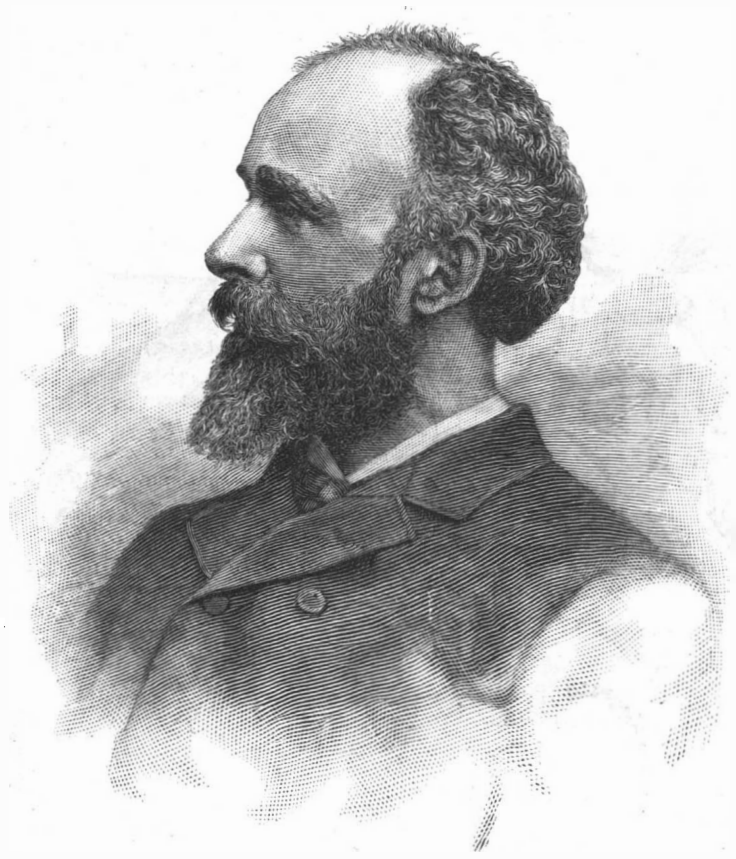
In 1866 he removed to Salem, Mass., and with Alpheus S. Packard, Alpheus Hyatt, and Frederick W. Putnam, founded the *American Naturalist,* one of the most prominent scientific monthlies in the United States.

His biological work was not neglected, and from 1862 till 1871 he published some twenty memoirs.

In 1871 he became professor of comparative anatomy and zoology in Bowdoin College, Brunswick, Me., and for three years remained in possession of that chair. In addition to his collegiate duties, he found time to prepare two papers on the Terebratulina, which he contributed to the Proceedings of the Boston Society of Natural History.*

Continuing his researches in this direction, he determined, in 1877, to visit Japan for the purpose of dredging along the coasts of the islands of that empire, in search of Brachipods, upon which he was still at work.

His studies soon attracted the attention of the Japanese government, and he was invited to accept the chair of zoology in the Imperial University of Tokio,



Edw S Morse.

RETIRING PRESIDENT OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

then recently established. After thoroughly organizing this department and laying the foundations for the splendid collections which have since been made in this field in the imperial museum, he resigned his post in 1879, to resume his labors at home.

During his stay in Japan, he established a zoological station in the bay of Yeddo for the purpose of training Japanese assistants in the work, and he obtained a large number of specimens for exchange with American societies.

In the winter of 1877–78, he came back to this country for the purpose of fulfilling certain lecture engagements, and while in Boston he communicated to the Society of Natural History some points new to science concerning the habits of Japanese lingula,† a form of life of particular interest to all naturalists on account of its persistence from the most ancient geological periods to the present time.

He returned to Japan in April, 1878, and again visited that country in 1882, when, after an extensive tour throughout the empire, he proceeded to China and thence home by way of Singapore, Java, and Europe, thus circling the globe.

During his sojourn in Japan, he was led to the study of the prehistoric remains, by his observance of some ancient shell heaps at Omori, not far from Tokio. These he soon examined and found to be similar to those described by Jeffries Wyman, along the shores of New England and in Florida, and those on the Baltic coast in Denmark, made known by Japetus Steenstrup. His researches subsequently embraced critical examinations of a similar nature at Otaru, and Hakodate in Yezo, and Higo.* From all of these localities large collections were made, which now are deposited in the Archæological Museum of the University of Tokio.

The nature of these finds gave evidence that the pottery found in the mounds was identical with that found in similar deposits in Brazil, thus indicating the common origin of the art. Moreover, in a communication to the Biological Society of the Tokio Dai Gaku,† he showed that this prehistoric people were cannibals, and in their residence of Japan preceded the Ainos, a hairy people, now of the northern islands, who were dispossessed by the present Japanese race, which has lived there over 2,000 years.

Incidentally, these researches led to a comparative examination of Japanese pottery, and from a few pieces his collection has grown to include specimens of all kinds, from the commonest sorts up to the most precious varieties. It is considered the "largest, most valuable, and completest collection of Japanese pottery in the world," and is worth not less than $100,000. The main portion of it is contained in a gallery some eighteen by thirty feet, built expressly for its accommodation, and connected with Professor Morse's residence in Salem.

He is now engaged in making a study of Japanese keramic art from an ethnological standpoint.

In 1881 he became the director of the Peabody Academy of Sciences, an office which he has since held, except during his visit to Japan in 1882.

His work in connection with this institution has been a most valuable one. By his advice important features have been introduced, notably the conspectus of the animal kingdom, for the specimens are so arranged that the series returns to the starting point, the sponges and other of the lowest forms of life confronting the apex of the organic world where the higher mammalia belong.

Professor Morse, as a lecturer, is exceedingly popular with his audiences, talking directly to them like one who has some information that he wishes to impart, and therefore puts his statements in such language that all can understand him.

He has also shown considerable mechanical skill, for besides inventing several plays for children, of which the game of battle is the most popular, he devised a museum bracket shelf that has become a standard feature in many of the largest museums and libraries in the country.

Professor Morse found that dark curtains hung before windows through which the sun shone freely soon became quite warm and induced an upward current of heated air. This led to his apparatus for the utilization of the sun's rays in heating and ventilating apartments, and has been in successful operation at his own residence in Salem, at the Boston Athenæum, and elsewhere.

Another ingenious device was the placing of a sheet iron jacket around a stove, and a pipe from without bringing a constant supply of fresh air to the intervening space, out of which it comes into the room thoroughly heated, so that the apartment is wholly free from the close atmosphere which makes stoves so objectionable.

His latest invention is a pamphlet jacket, consisting of a broad band which, by means of a tape and hook attached, secures a set of pamphlets in a compact bundle that may be easily undone, and attached to the band is a card on which to inscribe the contents.

His separate papers exceed fifty in number, and several of his more important scientific memoirs have been translated into French, Italian, German, and Russian. In addition to these he has contributed largely to newspapers, and to children's magazines such as the *Youth's Companion*, *Wide Awake*, and others, but in book form his publications are: "First Book in Zoology" (New York, 1875), illustrated by its author, and is a favorite text book for schools, both in the United States and England. It has also been translated into German and Japanese. His "Japanese Homes and their Surroundings" (Boston, 1885), likewise illustrated by himself, is an octavo volume of 400 pages, which, according to an eminent authority, "is the first book that has been written about Japan since Siebold."

In 1871, Professor Morse received the honorary degree of Ph.D. from Bowdoin College, and like all scientific men, he is a member of societies. He early joined the Boston Society of Natural History, and is a corresponding member of the Biological So-

* Proc. Bost. Soc. Nat. His., vol. vi., p. 1.
† Proc. Bost. Soc. Nat. His., vol. vii., p. 1.
‡ Proc. Bost. Soc. Nat. His., vol. ix.
§ Proc. Bost. Soc. Nat. His., vol. xv.

* "On the Early Stages of Terebratulina septentrionalis," vol. ii., p. 29, and "Embryology of Terebratulina," Vol. ii., p. 249.
† "On Japanese Lingula and Shell Mounds," *Amer. Jour. Sci.*, February, 1878.

* See "Memoirs of the Science Department of the University of Tokio, Japan." Part I. "Shell Mounds of Omori." (Tokio, 1879.) The composition and press work of these memoi s were done in a Japanese office, where the employes were unable to speak English.
† Tokio *Times*, January 18, 1879.

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ciety of Washington, of the Philadelphia Academy of Natural Sciences, and of the New York Academy of Sciences. In 1868, he was elected a fellow of the American Academy of Arts and Sciences, and in 1876 received his election into the National Academy of Sciences.

Professor Morse became a member of the American Association for the Advancement of Science at the meeting held in 1869, at Salem, and was advanced to the grade of fellow in 1874, having meanwhile filled the office of general secretary at the Dubuque meeting. In 1875, he was elected vice-president of the section on Natural History, and delivered at Buffalo his address on "What American Zoologists have done for Evolution," in which he reviewed the brilliant work accomplished by American naturalists toward substantiating the doctrine of natural selection. In 1884, he was again called to preside over one of the sections, this time that of anthropology, and chose as the subject of his address "Man in the Tertiaries," pointing out the possibility of the existence of human life at that remote period of the world's history.

At the meeting held in Ann Arbor, in 1885, he was elected president of the entire association, and acted in that capacity at the Buffalo meeting held last year. He will call the association to order at Columbia College, on Wednesday, the 10th instant, and after resigning the chair to Samuel P. Langley, will terminate his official relations by the delivery of his retiring address, on Wednesday evening.

THE FISH KILLER.

BY C. FEW SEISS.

The fish-killer belongs to the order Hemiptera and to the family Belostomidæ. The following remarks refer to the *Belostoma haldemanum* of Leidy, now placed in the genus *Benacus* by some authors. It measures from three to three and one-half inches in length. Its general color is dull brown, with a yellowish-white band between the eyes, extending upon the thorax, where it becomes less marked. The eyes are large and black. The body beneath is longitudinally marked with dark brown and dull yellow bands. The fore legs are powerful, without a groove in the femur, and each terminates in a single claw. It is with these raptorial legs that they seize their prey. The remaining four legs are each armed with two hooked claws. The posterior pair of legs are broad and flattened, fringed with hair, and are used as paddles or oars to propel the insect through the water. It is furnished with strong wings; and can fly well. Its beak is armed with a cutting or boring apparatus at its tip, by means of which it can easily penetrate the tissues of the animals upon which it feeds. It possesses large salivary glands, which doubtless secrete a poisonous saliva, for I have repeatedly noticed that a small animal ceases to struggle and is apparently dead almost instantly after the beak has entered its body. It feeds entirely by suction through the beak upon the blood and fluids of its prey. A peculiarity of these bugs is that they breathe through their tails, or draw in the air through the tip of the abdomen. They are generally found during the day on the under side of floating bark, dead wood, or other *debris*, completely submerged with the exception of the two little tails or setæ and the tip of the abdomen, which are kept above the surface of the water. Sometimes a large amount of air is drawn in and held in the form of flattened bubbles between the wings and body, which fit closely together, and I presume they use this air for breathing purposes when they remain beneath the water for any length of time. In the aquarium I have never noticed them to remain under water for over thirty minutes at a time.

They seem to prefer the quiet water of brooks and ponds, where small fishes and tadpoles are abundant. When food becomes scarce and the water low, they migrate during the night to other bodies of water. They generally capture their prey at twilight or in the night; at least, such has proved the case when in captivity.

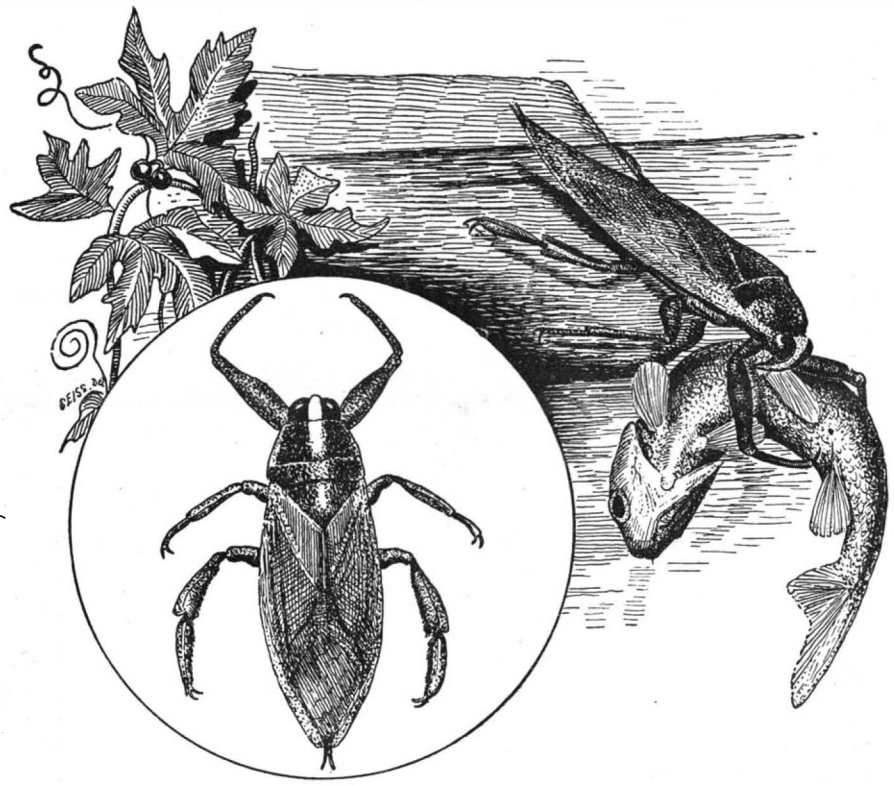
I am confident that to be pierced by the beak of a fish killer would cause a painful wound. At a time when one of them was about to crawl out of the aquarium I brushed it back with my finger, which it instantly seized with its fore legs, no doubt mistaking it for something to eat; and although I pushed it off immediately, and am quite certain its beak did not touch my finger, yet I experienced a tingling sensation in the finger, followed by a semi-numbness which lasted for five or six hours. The scratch of its claws alone must have produced this, yet I could observe no marks whatever.

The following notes on the habits of the fish killer I take from my journal:

May 22, 1887.—Placed a large diving beetle (*Dytiscus*) in an aquarium containing a *Benacus haldemanum*. I observed that when I dropped the beetle in and it began swimming about, the fish killer crept under a large stone, as if to hide. An hour later, when I looked into the aquarium, *Benacus* was on the top of the stone, beneath the water, with the unfortunate *Dytiscus* firmly held in his raptorial fore legs, and his beak thrust deeply in the body of the beetle, between thorax and abdomen, on the under side. Of course, the beetle was limp and dead. In two hours or more, after he had sucked all the blood and fluids from the beetle, he discarded the remains. I found that the thorax and abdomen of the beetle were held together by merely a few shreds. The connecting tissue of the suture must have been separated by numerous punctures of the powerful beak, or softened by the saliva, which is copiously exuded.

June 1.—Two gold fishes were added to the aquarium containing the fish killer. One fish measured exactly 3½ inches in length, and the other nearly 4. On the same evening, about 7 o'clock, the *Benacus* darted at and seized the smaller of the fishes, but it struggled and dashed the bug off in an instant. On June 2 another fish killer was put in the aquarium.

Saturday, June 4.—At 7:10 P.M. I visited the aquarium and found both of the fish killers resting quietly on the under side of a floating block, with nothing but their breathing tubes above the surface of the water. At 7:30 I again took a look at the aquarium. Something startling had happened. The larger *Benacus*, the one first captured, was still clinging to the under surface of the block, but in the deadly clasp of his fore legs he tightly held one of the gold fishes. There was no motion discernible in any part of the fish, it was dead to all outward appearances. The beak of the fish killer was inserted in the fish near the base of the anal fin, and *Benacus* was sucking in a vigorous and contented manner. At 12:15 P.M., the fish killer was still clasping the fish, which had now become as limp as a rag, the head hanging over until it touched the tail. The beak of the fish killer was inserted near the gills of the fish, and the belly had been pierced and probed for blood and fluids at about every eighth of an inch from the vent to beneath the gills. In the morning the dead gold fish was floating on the water. It was much collapsed, and somewhat discolored along the abdomen. The fish killers were still on the floating block.



THE FISH KILLER (BENACUS HALDEMANUM).—⅔ Natural Size.

Arctic Cold.

A person who has never been in the polar regions can probably have no idea of what cold really is; but by reading the terrible experiences of arctic travelers in that icy region some notion can be formed of the extreme cold that prevails there. When we have the temperature down to zero out of doors we think it bitterly cold, and if our houses were not so warm as, at least, 60 degrees above zero, we should begin to talk of freezing to death. Think, then, of living where the thermometer goes down to 35 degrees *below* zero in the house in spite of the stove. Of course, in such a case the fur garments are piled on until a man looks like a great bundle of skins. Dr. Moss, of the English polar expedition of 1875 and 1876, among other odd things, tells of the effect of cold on a wax candle which he burned there. The temperature was 35 degrees below zero, and the doctor must have been considerably discouraged when, upon looking at his candle, he discovered that the flame had all it could do to keep warm. It was so cold that the flame could not melt all the wax of the candle, but was forced to eat its way down the candle, leaving a sort of skeleton of the candle standing. There was heat enough, however, to melt oddly shaped holes in the thin walls of wax, and the result was a beautiful lace-like cylinder of white, with a tongue of yellow flame burning inside it and sending out into the darkness many streaks of light. This is not only a curious effect of extreme cold, but it shows how difficult it must be to find anything like warmth in a place where even fire itself almost gets cold. The wonder is that any man can have the courage to willingly return to such a bitter region after having once got safely away from it, and yet the truth is that the spirit of adventure is so strong in some men that it is the very hardship and danger which attract them.

The Cellerier-Parkes Photographic Process.

The brief interest that was raised some short time since by the announcement—founded on misapprehension—that a process had been invented of securing natural colors by photography has died away, and the real foundation upon which so fanciful a claim was reared appears to have sunk out of sight, and to be replaced by the very practical Cellerier Parkes process, which has already established its claim to be regarded as a highly ingenious and successful application of some of the later developments of photography. It is based upon the carbon process, which, though old of itself, has been lately perfected so far that permanent sun pictures can be produced with rapidity and certainty. Told very briefly, the carbon process consists in the exposure behind a negative of a sensitized gelatine film containing finely divided carbon, or other suitable pigment, and mounted on paper from which it can be subsequently stripped on immersion in warm water. The bichromate of potash or other sensitizing medium renders the gelatine more or less insoluble, according to the energy of the light falling upon it, and which is of course regulated by the negative. After exposure the film is laid upon glass and is placed in warm water, when the paper backing comes away, the superfluous and soluble gelatine is washed out, and the definite picture, with all its light and shades determined by the thickness of the pigmented gelatine film, is left behind. When dry, this film is so thin that irregularities on its surface are inappreciable. The film is afterward stripped from the glass and mounted on a suitable permanent support of paper. So far this is an old and well known process, and the Cellerier-Parkes development commences with the treatment of the permanent paper support, which previous to being attached to the picture is held in contact with it temporarily, while it is still attached to the glass. The operator, for whom great skill is not necessary, is able to see the picture through the paper by transmitted light, and covers it with flat washes of suitable colors, but of a stronger tone than would be desirable for the finished work. This paper is then detached, the carbon film is stripped from the glass, and the face, which was in contact with the latter, is carefully laid to register with the colored washes on the paper. The film and paper are then brought into intimate contact, subjected to a steaming process, and by this means they are thoroughly cemented. The colors laid on the permanent support are then seen through the carbon film, much softened and subdued, all the lights and shadows being produced by the pigmented carbon. *Engineering* says the art of producing colored photographs can scarcely be carried much further than by the very simple means of which we have indicated the outlines, and which are equally adapted for landscape work and for portraits, as a visit to the Cellerier-Parkes studios in Pall Mall or the Poultry will show. The process appears, in fact, to be another step in popular art education, which has made such prodigious strides of late years.

Pigeon Weather Reporters.

Mr. O'Donnell, of the U. S. Signal Service, has gone to Key West, Fla., for the purpose of establishing communication, by means of homing pigeons, between that point and the West India islands, for the benefit of the signal service. Mr. O'Donnell will commence his experiment with about fifty young birds. When properly trained, he will give the birds to captains of vessels, who will take them out to sea and liberate them. At first he will take them out four or five miles, gradually increasing the distance until the West Indies are reached. It will enable the signal service, if the birds can be successfully trained, to give quicker and more definite and reliable information in regard to the prevalence and character of storms, and the condition of the weather on the several islands. It is calculated a pigeon will make the trip between Nassau and Key West, about sixty miles, in one hour and a half.

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THE HOUSE OF ADELANTADO MONTEJO.

FIRST HOUSE BUILT BY THE SPANIARDS IN YUCATAN.

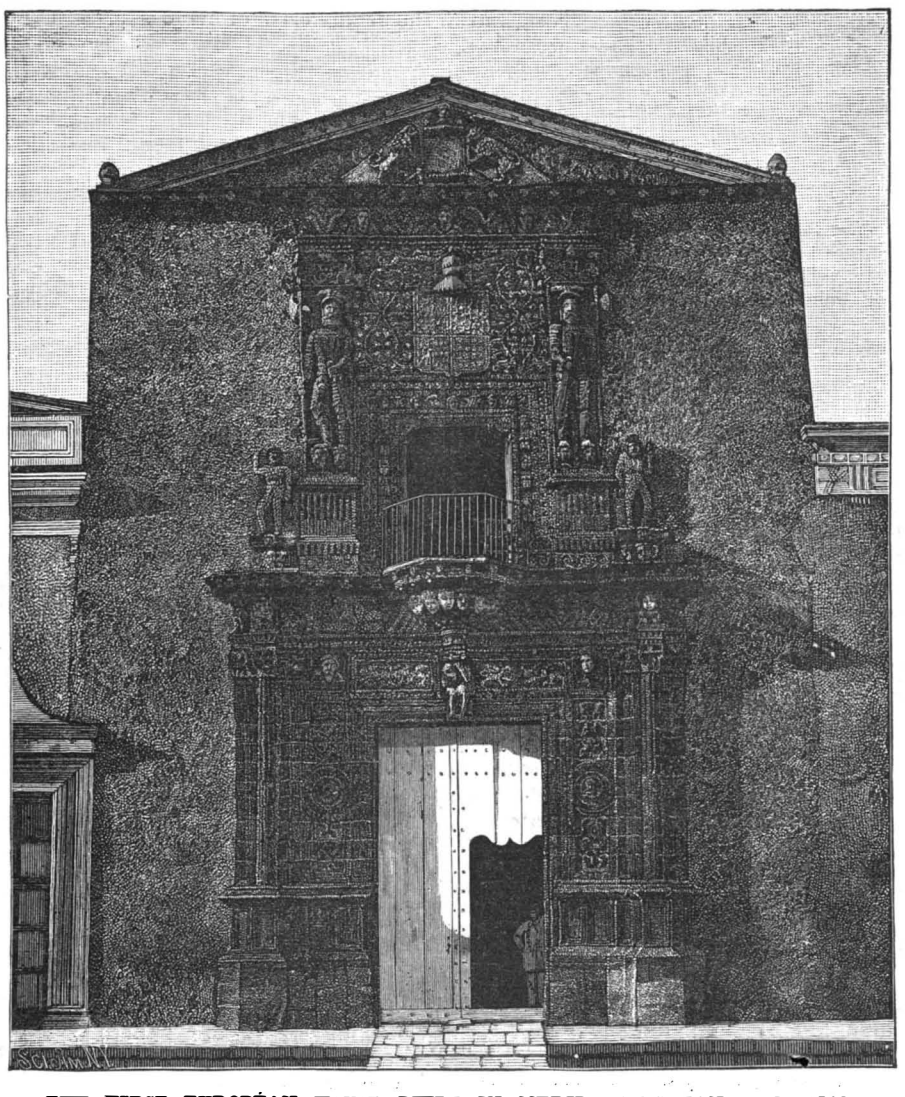
Merida, Yucatan, was founded on the site of an ancient Maya city, called Tihoo, in 1542, by Don Francisco de Montejo, Lieutenant-Governor and Captain-General. He was son of the Adelantado, Governor and Chief Justice of the provinces of Yucatan and Cozumel, Don Francisco Montejo.

Having conquered the nation, the Spaniards first built their dwellings like those of the aborigines, which are oblong huts, with the corners rounded. The wall is made of posts about six feet high stuck in the ground, tied together with very strong withes, as are the rafters of the roof. This is very slanting, and made of long, thin sticks, closely interlaced, and thatched with palm leaves brought down to within three or four feet of the ground, to serve as protection from wind and rain, being cropped short only over the doorway. The interstices between the posts that form the wall are filled up with mud, smoothed and whitewashed. There are no windows, but generally two doors, exactly opposite each other, though many have but one. The huts are 15 to 20 feet long and about 10 feet wide. The earth serves as a floor. These dwellings vividly recall to mind those of the Fans and others of equatorial Africa, as described by Paul B. Du Chaillu. Some of the huts have stone walls; then the thatch is cut shorter.

When the conquerors were no longer satisfied with that sort of dwelling, they destroyed some large stone mounds that surrounded what is now the central square, called *Plaza de la Independencia*, and used the stones to build their city, commencing on the same spot. The first house constructed under Montejo's direction is on the south side of the square, yet in good condition, because Senor Don Jose Maria Peon, the present owner, takes great pride in it, has the facade kept clean, and all necessary repairs made. On a stone in the facade are inscribed these words in Spanish: *The Adelantado Don Francisco Montejo caused this to to be made in the year* 1549. The historian Father Cogolludo, in his interesting "History of Yucatan," book iv., chap. x., p. 205, says that the facade alone cost $14,000.

Prominent among the elaborate ornaments are Spaniards stamping upon decapitated heads of Indians. The Spaniards are in full armor, while the Indians are represented with tears streaming down their cheeks. Alas! that this should be even yet symbolical of the social condition of the poor Indian, though a free (?) Mexican citizen!

The Montejo building is a curious combination of Spanish and Indian art. The invaders designed, the vanquished did the work, and many of the signs and figures are emblems of mythology and superstition. The structure is a little narrower at the top than at the base, as seen in the illustration. At the very top, above a tablet held by two lions, is a face, said to be intended for the Adelantado himself, and we see a similar face just below the middle of the cornice under the tablet. Not far from this second face, on either side of it, are others, the son and daughter of the same gentleman. Beneath are the warriors mentioned, and between them the Spanish royal coat of arms.



THE FIRST EUROPEAN HOUSE BUILT IN MERIDA, YUCATAN, A. D. 1549.

Then comes the window, more like a great doorway, and a circular balcony, with several small heads just below the railing. Yet lower, and closer together, is another row of infantile heads, perhaps meant for cherubim. The balcony rests on the shoulders of a nude man, who, like a caryatid, sustains it as Atlas, in Greek mythology, was supposed to support the earth; only in this case the burden appears to be somewhat heavy for the individual, if we judge by his sad expression and forced posture.

Near the upper corner of the gateway is a face intended for a portrait of King Fernando. At the opposite corner is the sculptured bust of a woman in low necked dress, representing Isabella, Fernando's queen. The two faces are turned toward each other. A few feet below them are medallions, with pictures of a man and woman: on one side, Señora Dona Beatrice de Montejo; on the other, Senor Don Francisco Montejo, first owner of the house. Altogether this old edifice is curious and unique.

The gateway leads into a large open court, surrounded by apartments that have nothing interesting about them, being just the same as those of any other house in Merida.

ALICE D. LE PLONGEON.

THE eyebrows may be darkened permanently by a silver hair dye, which can be had from any druggist.

Strange Remedies.

In an article on "Strange Medicines," in the *Nineteenth Century*, Miss Cumming quotes a few of the healing spells which are *to this day* practiced by the peasantry of various districts in Great Britain, and which are considered certain remedies.

The Northumbrian cure for warts is to take a large snail, rub the wart well with it, and then impale the snail on a thorn hedge. As the creature wastes away, the warts will surely disappear. In the west of England, eel's blood serves the same purpose. For goiter or wen, the hand of a dead child must be rubbed nine times across the lump, or, still better, the hand of a suicide may be substituted.

In the vicinity of Stamfordham, in Northumberland, whooping cough is cured by putting the head of a live trout into the patient's mouth, and letting the trout breathe into the latter. Or else a hairy caterpillar is put into a small bag and tied around the child's neck. The cough ceases as the insect dies.

Another cure for whooping cough is offerings of hair. In Sunderland, the crown of the head is shaved and the hair hung upon a bush or tree, with the full faith that as the birds carry away the hair, so will the cough vanish.

In Lincolnshire a girl suffering from the ague cuts a lock of her hair and binds it around an aspen tree, praying the latter to shake in her stead. In Ross-shire, where living cocks are still occasionally buried as a sacrificial remedy for epilepsy, some of the hair of the patient is generally added to the offering. At least one holy well in Ireland (that of Tubber Quan) requires an offering of hair from all Christian pilgrims who come here on the last three Sundays in June to worship St. Quan. As a charm against toothache, it is necessary to go thrice around a neighboring tree on the bare knees and then cut off a lock of hair and tie it to a branch. The tree thus fringed with human hair of all colors is a curious sight and an object of deep veneration.

The remedy for a toothache at Tavistock, in Devonshire, is to bite a tooth from a skull in the churchyard, and keep it always in the pocket.

Spiders are largely concerned in the cure of ague. In Ireland, the sufferer is advised to swallow a living spider. In Somerset and the neighboring counties, he is to shut a large black spider in a box and leave it to perish. Even in New England, a lingering faith in the superstitions of the mother country leads to the manufacture of spider web pills for the cure of ague, and Longfellow tells of a popular cure for fever—

"By wearing a spider hung round one's neck in a nutshell."

This was the approved remedy of our British ancestors for fever and ague; and in Sussex, a live spider rolled up in butter is still considered good in cases of obstinate jaundice.

At Loch Carron, in Ross-shire, an occasional cure for erysipelas is to cut off half the ear of a cat and let the blood drip on the inflamed surface.

In Cornwall, the treatment for the removal of whelks or small pimples from the eyelids of children is to pass the tail of a black cat nine times over the part affected.

In Devonshire, the approved treatment for scrofula is to dry the hind leg of a toad and wear it round the neck in a silk bag; or else to cut off that part of the living reptile that answers to the part affected, and, having wrapped the fragment in parchment, to tie it round the sufferer's neck.

In the same county the "wise man's" remedy for rheumatism is to burn a toad to ashes and tie the dust in a bit of silk to be worn round the throat.

Toads are made to do service in divers manners in Cornwall and Northampton for the cure of nose bleeding and quinsy; while "toad powder," or even a live toad or spider, shut up in a box, is still in some places accounted as useful a charm against contagion as it was in the days of Sir Kenelm Digby. The old smallpox and dropsy remedy, known as *pulvis æthiopicus*, was nothing more nor less than powdered toad.

Frogs, too, are considered remedial. Thus, frog's spawn placed in a stone jar and buried for three months till it turns to water has been considered wonderfully efficacious in Donegal, when well rubbed into a rheumatic limb. In Aberdeenshire, a cure for sore eyes is to lick the eyes of a live frog. A man thus healed has thenceforth the power of curing all sore eyes by licking them!

In like manner, in Ireland, it is believed that the tongue that has licked a lizard all over will be forever endowed with the power of healing whatever sore or pain it touches.

Another Irish remedy is to apply a fox's tongue to draw a thorn from the foot. The tooth of a living fox, worn as an amulet, is deemed a cure for an inflamed leg. For deep-seated thorns, the application of a cast-off snake skin is efficacious—not to attract the thorn, but to expel it from the opposite side of the hand or foot.

In some of the Hebridean Isles, notably that of Lewis, the greatest faith prevails in the efficacy of perforated water-worn stones, called "snake stones." These are dipped into water, which is then given to cattle as a cure for swelling or for snake bite. If the stone is unattainable, the head of an adder dipped in the water gives an equally good result.

In Devonshire, any person bitten by a viper is advised to kill the creature at once and rub the wound with its fat. It is said that this practice has survived in some portions of the United States, where the flesh of the rattlesnake is accounted the best cure for its own bite. Black, in his "Folk Medicine," states that the belief in the power of snake skin as a cure for rheumatism still exists in New England. Such a belief is probably a direct heritage from Britain.

In Durham, an eel's skin, worn as a garter round the naked leg, is considered a preventive of cramp, while in Northumberland it is esteemed the best bandage for a sprained limb.

So, too, in Sussex, the approved cure for a swollen neck is to draw a snake nine times across the throat of the sufferer, after which the snake is killed, and its skin sewed in a piece of silk and worn round the patient's neck. Sometimes the snake is put in a bottle, which is tightly corked and buried in the ground, and it is expected that, as the victim decays, the swelling will subside.

Treatment of Insect Stings.

The stings of insects, such as gnats, mosquitoes, etc., says *Le Pharmacien Populaire*, are often painful. In such a case apply spirit of hartshorn or volatile alkali to the part. Spider bites are not only painful, but often venomous, and it is necessary to wash them with salt water or diluted vinegar. The sting of the bee is harmful only when the sting remains sticking in the wound. So the first thing to be done is to press the wound in order to make it bleed, since the blood that flows will carry along a portion of the poison. Then suck the wound and wash it well with water and then with a solution of knos powder. This latter, which is much used in England, consists of three parts of chloride of lime to eight of common salt. An ounce of this powder is to be dissolved in a tumbler of water. If this composition is not to be had, Goulard's extract may be used. For the sting of the scorpion, volatile alkali should be used, and after the pain subsides, an emollient cataplasm may be applied.

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ENGINEERING INVENTIONS.

A rotary engine has been patented by Mr. George Barr, of La Center, Washington Ter. It consists of a hollow revoluble shaft carrying a hollow cross arm or tube, the ends of which are closed, and which has side ports passing through opposite sides of the arm near either end, with other novel features of construction and combination of parts.

A railway plow has been patented by Mr. Frank Nearing, of Schuylkill Haven, Pa. A truck constructed to run upon a railway track has plows connected by means of pivoted side bars to the frame of the truck, so as to run in contact with the ground at either side of the track, and there are means for raising and lowering the plows and of tilting them upon the truck.

A car coupling has been patented by Mr. Donald E. La Lone, of Miles, Iowa. The drawhead is arranged with three independent recesses or sockets, each adapted to receive a coupling link, and has pivoted heavy plates, with their forward ends beveled to assure easy entrance of the link into any of the sockets, with other novel features, whereby high or low cars may be coupled together automatically with an ordinary link.

A steam generator has been patented by Mr. Albert M. Bowers, of Newark, N. J. Combined with a boiler are two or more sets of steam generator tubes, each set connected to end reservoirs common to all the tubes of the series, a supply reservoir, connections between it and the boiler, and between it and the end reservoirs, and between the generator tubes and the boiler, with other novel features, to promote circulation, clear the water of sediment, and economically generate dry steam.

AGRICULTURAL INVENTION.

A combined straw carrier and stacker has been patented by Mr. William C. Buchanan, of Belleville, Ill. It is so made that it can be easily and quickly adjusted on uneven ground, and the stacker can, when the machine is in motion, be swung in any direction, it being generally attached to the rear part of the thrashing machine, but so it can be transported independently thereof.

MISCELLANEOUS INVENTIONS.

An improvement in overalls for the use of artisans and laborers has been patented by Mr. Jesse F. Diggs, of Baltimore, Md. It consists mainly in using a re-enforcing strip on each side, which extends from the seam at the seat around the outside of the hip and down across the knee to the inseam of the leg.

A combined window ventilator and shade has been patented by Mr. Thomas Dean, of Paterson, N. J. Combined with a U-shaped frame pivoted to the lower end of the window casing are folding strips secured to the sides of the casing and to the sides of the frame, a window shade being secured to a roller mounted on the frame.

A portable cooking apparatus has been patented by Mr. Gustav Warnecke, of Frankfort-on-the Main, Germany. Combined with a cooking vessel formed with a central tube to serve as a fire chamber is a bail bent at its middle to form a grate for the fire chamber, while it can be used in the ordinary way upon a stove or over an open fire.

A photographic paper roll holder has been patented by Mr. Erastus B. Barker, of New York City. The invention includes a movable frame for carrying the rollers and paper, devices controlled by pressure for making and breaking connection with the indicator which controls the measure of the paper as it is unrolled for use, and various other novel features.

An axle box has been patented by Mr. Frederick J. Wiles, of Grassy Point, N. Y. The journal portion of the axle is made hollow to receive oil, and has small orifices for its escape to the surface of the axle, the axle having a collar over which the axle box fits, the latter being held in the hub of the wheel by a nut that closes the end of the hollow axle.

A bottle holder has been patented by Mr. Austin F. Jackson, of Taunton, Mass. It consists of a bottle-shaped body having pins projecting horizontally in opposite directions, with a detachable cup-like base having perforated lugs or sockets, both the body and base being lined with flannel or some other soft material.

A composition of matter for plastering walls, etc., has been patented by Mr. Geo. H. Wooster, of West New Brighton, N. Y. It consists of gypsum, marble dust, and an adhesive material, as glue, gum arabic, or sugar, prepared and combined in a novel manner, and mixed with water to make cornices and other decorations, with a hard finish.

A mosquito net frame has been patented by Mr. Albert C. Lottman, of Houston, Texas. It has two standards with rounded heads, united by a horizontal bar, carrying side bars with a cross piece, all adjustably united, in such way that the frame may be easily attached to a bed and the frame may be frequently taken apart and joined again without damage.

An automatic dam has been patented by Mr. Horace Harding, of Tuscaloosa, Ala. It is so constructed as to give increased waterway over dams in time of freshets, and is an improvement on a former patented invention of the same inventor for that purpose, each valve for the escape of water to be automatically opened as the water rises.

A sleigh brake has been patented by Mr. Edward C. Selle, of Embarrass, Wis. This invention covers a novel apparatus for use in connection with any of the ordinary forms of sleigh by which the driver may regulate the speed of the sleigh in going down hill, and, in ascending, it may be readily applied as a stop for the purpose of giving the horses a rest.

A miner's outfit has been patented by Messrs. Edward Williams, Jr., and David E. Keller, of Centralia, Pa. The invention covers a novel construction of a practical and convenient supply case for carrying squibs, paper, small tools, etc., affording separate compartments and protecting the contents from dampness.

A sled has been patented by Mr. Jacob H. Nicholson, of Oxford, Md. The rear portion of the seat is adjustable to occupy a plane above the forward portion, or it can be adjusted to form a back, or the two sections of the seat may be adjusted to occupy the same plane, so that the rear portion of the seat may be firmly locked in either of three positions.

A garment supporter has been patented by Messrs. Theodore Gentzsch and Gustave A. Witte, Jr., of Brooklyn, N. Y. It consists of a plate with slotted end, a loop and eye on opposite sides of the slot, a needle-carrying arm being pivoted to the plate, making a cheap and effective device for supporting stockings and shirt sleeves, and for similar uses.

A gate has been patented by Mr. John S. Heaton, of Shelbyville, Ky. This invention relates to that class of gates adapted to be opened and closed by the operation of levers within reach of persons walking, or on horseback, or in vehicles, the gate being simple in construction, and latching automatically in both open and closed position.

A picture frame has been patented by Mr. Michael Hogan, of Pelham, N. Y. The object is to produce a frame in which the picture will be flush with the front surface, the picture being mounted in a depression in the frame, and secured by covering the outer surface and a portion of the outer upper surface of the picture with a flexible material.

A halter trimming has been patented by Messrs. Bion E. and D. Everett Martin, of Sycamore, Ohio. The invention consists of a web-holding device designed more especially for use in web halters, for holding the web and for adjusting it to diminish or increase the size of the halter, any strain upon the web rendering it self-binding in the adjuster or holder.

A defecator for cane juice has been patented by Mr. Leon F. Haubtman, of New Orleans, La. It consists of a vessel having a double steam coil arranged to receive steam from the center and discharge the steam and the water of condensation from the outer ends of the coil, with other novel features for utilizing the waste steam.

A circle scribing attachment for squares has been patented by Mr. William F. Seargeant, of Marshall, Mo. This invention covers an improvement on a former patented invention of the same inventor, making an improved implement for marking weather boards where they abut against the window casings or corner boards, and for other uses.

An apparatus for making and storing gas has been patented by Mr. James J. Powers, of Brooklyn, N. Y. The invention covers a simple apparatus of generator, tanks, and pipes, in connection with a holder, for making chlorine or similar gas by mixing or volatilizing chemicals, and storing the gases to prevent escape by permeation of a liquid seal or evaporation.

An improvement in trousers has been patented by Mr. Aaron J. Shriver, of New York City. Combined with the knee part is a diamond-shaped strip of fabric, secured at two opposite points of its sides only, with a tape attached to the upper edges of the strip and to the trousers near the waistband, the improvement being also applicable to the elbows of dresses and coats, to prevent stretching or bagging out.

A water elevator has been patented by Mr. George W. Mefferd, of Stephenville, Texas. It has a suspended bucket and means for raising and lowering it, a tilting fork receiving the raised filled bucket, with an arm catching under the bucket to tilt it to discharge its contents as the fork is tilted, making a simple and improved device for lifting water from wells or cisterns, etc.

The ornamenting of window shades forms the subject of a patent issued to Mr. Edwin P. Benjamin, of Minetto, N. Y. The shade is made of translucent fabric, with designs on both sides, so that at certain times the inner design only will be visible, at other times only the outer design, and at some periods, according to the light within or outside of the room, both designs will show.

A nut lock has been patented by Mr. Benjamin N. Deblieux, of Bay St. Louis, Miss. The nut has a concave spring flange slotted radially, some of the arms being of greater thickness to exert a greater force when under strain, and allowing the expansion or contraction of the bolt or body clamped by the bolt, without danger of breaking or straining the bolt or nut.

A method of subdividing and designating land has been patented by Mr. William A. Baugh, of Melbourne, Fla. It consists of a method of dividing the land into sections, numbered successively, and then dividing each section into four equal squares, each of which is divided into four equal squares, and each of the latter again into four equal squares, all being designated by numerals or letters.

An attachment for hat pouncing machines has been patented by Mr. George Van Wart, of Yonkers, N. Y. It is applicable to all forms of machines employing a revolving roller, combining with the pouncing roller a wood block, bow spring, and metal plate, and other novel features, whereby both surfaces of the material are given a comparatively uniform and similar working at the same time.

A clay press feeder has been patented by Mr. Thomas F. Anderson, of Walker's, Ohio. It consists of a revoluble plate or disk partially surrounded by a cylindrical curb, with an opening leading to a chute to which the clay is delivered by means of a fixed scraper, the chute delivering the clay to a revoluble cylinder arranged to throw the clay into the press, as it may be required to be fed.

A hook attachment for doubletrees has been patented by Mr. William A. Petrie, of Hillsdale, Mich. It is designed to take the place of the usual center clevis, and consists of a swivel hook composed of two hooks on opposite sides of its body, one a close and the other an open hook, combined with a tapering eyebolt on which it swivels, the eye of the bolt freely engaging with a staple that detachably fastens the whole to the doubletree.

A loom for weaving tufted fabrics has been patented by Messrs. John J. Devitt and John Corcoran, of Yonkers, N. Y. The invention consists of improvements in the construction and operation of the shuttle race and carrier, the tension device for the weft thread, the nippers that draw the tuft yarns down through the warp, the knives that cut the tufts, and the comb that lifts the tuft yarns up through the warp, in looms more especially designed for weaving moquette carpets and similar fabrics.

An equalizer for drawers has been patented by Mr. Joseph H. Knaus, of Fayette, Mo. It is to enable furniture drawers to be drawn out evenly, without cramping and binding, for which purpose a shaft is journaled in the drawer, around which is wound at each end a cord, one end of the cord being attached to a stationary part of the drawer casing at the back, and at the other to the front part of the casing, the pulling out of the drawer winding and unwinding the cord upon the shaft.

Metallic alloys form the subject of four patents issued to Mr. Charles Auguste Paillard, of Geneva, Switzerland. The materials composing the alloys are palladium, copper, nickel, gold, platinum, silver, steel, and iron, some of the alloys having only a few of these ingredients, and all of them being in varying proportions, with special methods for their combination. The object sought by this invention is to make metallic alloys especially adapted for different parts of clock, chronometer, and fine watch work, which shall be neither oxidizable nor magnetic, with small capabilities of dilatation, and having hardness and elasticity, and more or less of the properties of steel, according to the particular use to which the alloy is to be put, and the grade of watch, clock, or chronometer to be made therewith.

SCIENTIFIC AMERICAN
BUILDING EDITION.

AUGUST NUMBER.

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Special.

KEEN AS A SURGEON'S KNIFE.

On the Chicago Limited Express, one of those splendid trains that leave New York over two of the great trunk lines of this country and make the dash to the metropolis of the West with such remarkable speed, an elderly gentleman was, a few days ago, seized with a violent attack of asthma. He had been a sufferer for many years, and his efforts to breathe were dreadful to witness. A physician was found on the train, but relief seemed impossible. Everything was done for the comfort of the passenger, but he speedily grew worse. His face assumed a livid hue, and it appeared that he had only a few minutes to live. Suddenly a lady in the car seized the porter by the arm, sent him flying to the range in the dining car for boiling water, while from a satchel she drew out one of Drs. Starkey & Palen's Compound Oxygen Inhalers. By the time the porter had returned with a salad bowl filled with boiling water, the lady had the corks out of the bottle, the glass tubes fitted, and, in less time than it requires to tell it, the inhaler was immersed in the heating liquid. A moment more and the ozone began to evolve and the inhaling tube was placed in the sufferer's mouth. He was so exhausted that he could only breathe the gas in a spasmodic manner, but at the end of a minute his inhalations became more lengthy and regular, and at the end of five minutes the wheezing ceased, and he was able to rest easily. Of course the sufferer was greatly weakened, but he had no recurrence of the attack. The entire train rang with praises of Compound Oxygen during the balance of the journey.

Apropos of this case, J. B. Kenyon, a merchant of Bedford, Ohio, writes to Drs. Starkey & Palen, September 11, 1885:

"Your Compound Oxygen has worked wonders with me; has made a new man of me. I have not had an attack of asthma since using it, though I was in very bad shape when I began. I would not do without the 'Compound Oxygen' for ten times its price. On retiring at night I go to sleep at once, and never rested better in my life than I do now. Shall recommend it to all my friends."

A complete and interesting treatise on the cures effected by Compound Oxygen will be sent, postage prepaid, to any one curious to know its valuable properties. Address Drs. Starkey & Palen, 1529 Arch Street, Philadelphia, Pa.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

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For the latest improved diamond prospecting drills, address the M. C. Bullock Mfg. Co., 138 Jackson St., Chicago, Ill.

The *Railroad Gazette*, handsomely illustrated, published weekly, at 73 Broadway, New York. Specimen copies free. Send for catalogue of railroad books.

The Knowles Steam Pump Works, 113 Federal St., Boston, and 93 Liberty St., New York, have just issued a new catalogue, in which are many new and improved forms of Pumping Machinery of the single and duplex, steam and power type. This catalogue will be mailed free of charge on application.

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Curtis Pressure Regulator and Steam Trap. See p. 253.

Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N.Y. See illus. adv., p. 28.

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NEW BOOKS AND PUBLICATIONS.

THE ECONOMIC THEORY OF THE LOCATION OF RAILWAYS. By Arthur Mellen Wellington. New York: John Wiley & Sons and the *Engineering News*. Pp. xx, 980. $5.

This is a greatly enlarged edition of a volume put forth by the same author ten years ago, which was received with great favor at the time, and has since been considered among the standard works upon the subject. In this volume there is much new matter. The theory

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of the effect of variations in velocity on the motion of trains is fully treated of; the mechanics of curve resistance is discussed from the standpoint of a large amount of data obtained from actual experience; the theory of various details of the locomotive is set forth, with ample references to the numerous designs which have proved most effective, as well as the greater number where innovations have proved unwise; and the whole work is written with the practical end of railway construction ever in view—the relation of cost to probable traffic and revenue. The writer has been a regular contributor to publications making a specialty of railway construction and operation for many years past, and has thus kept abreast of the topics which most interest practical men in this line, while he has also filled engagements as an engineer in the location and surveys of the Mexican National and Mexican Central Railways, and the American line from Vera Cruz to the city of Mexico. The volume is well printed and fully illustrated.

ELEMENTARY PRACTICAL PHYSICS. Vol. II. ELECTRICITY AND MAGNETISM. By Balfour Stewart and W. W. Haldane Gee. London and New York: Macmillan & Co. Pp. xviii, 497. $2.25.

In this book the text is subdivided into a series of lessons, 83 in all, each descriptive of something to be done by a definite method with definite apparatus, the divisions being made in a way calculated to lead young investigators to a more systematic study of electricity and its manifestations by a plainer marking of the steps from the simple to the complicated. The first three chapters or 22 lessons are introductory, and largely elementary, but the matter which they contain is presented in attractive form, with a clearness of arrangement and conciseness of statement that make a good foundation for the study of the less elementary portions of the subject that follow. The book is, throughout, conspicuously free from vague generalizations, setting forth theories concisely, defining questions, describing apparatus, and presenting numerous experiments for practical trial, with full precautions and instructions for doing the work.

SHORT LECTURES TO ELECTRICAL ARTISANS. By J. A. Fleming. London and New York: E. & F. N. Spon. Pp. 206. $1.50.

These lectures were delivered by the author to the pupils and workmen of an English firm largely engaged in electrical work, to better instruct those thus practically engaged in the business as to the principles underlying modern electrical engineering. They are most entertaining in form, abounding in anecdote and reminiscence, and happy in the use of comparisons likely to fix troublesome data in the memory, and cannot fail to meet with a large audience among the great numbers who are now interesting themselves in electrical investigations, besides those who find their occupation in this field.

The Vulcanite Emery Wheels Price List of the New York Belting and Packing Company is an instructive pamphlet, which all users of goods in this line would do well to consult. It is herein urged that for all general work, wheels should be run at a high speed—with a circumferential travel of 6,000 feet per minute and over; and the mode of manufacturing the vulcanite wheel is described, to show how it is that they are not liable to burst, even when run at the very highest speed which users may desire. It is also claimed that the compressed vulcanized rubber in which the particles of emery are held in the wheel forms a just sufficiently elastic backing to present in most effective form the cutting edges of the emery to the work, making the wheel as durable as it is capable. The book is full of valuable and interesting information.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.
References to former articles or answers should give date of paper and page or number of question.
Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(1) A. J. A.—Professor L. O. Howard, of the Division of Entomology, Washington, says: "The small brown beetle which you find in your flour is the common *Sitodrepa panicea*, a species which is found in almost all parts of the world, and which is a very general feeder. It is particularly fond of stored food products, and will breed in large numbers in many of the dried roots which are kept in drug stores. From its great diversity of food it is a difficult insect to fight, and the method of treatment of course will depend upon the individual case to be treated. The vapor of bisulphide of carbon can be successfully used where the insect infests any substance which can be placed in a tight box or barrel, and which will not be injured by the fumes. Occurring in a house in the manner described (and I think I never heard of an exactly parallel instance), it will probably be found by careful examination that there is some particular spot or some particular substance in which the beetles breed and from which they spread; or it will be found that the shop from which food supplies are purchased is infested. The beetle would not develop without a plentiful supply of some kind of food, and it will not be difficult to eradicate it by going carefully over the storeroom and examining all the food supply on hand, destroying that which is badly infested, and afterward fumigating the room with the bisulphide. The other specimen is a small, active, silvery white insect about a quarter of an inch in length and elongate-ovate in form. It belongs to the genus *Lepisma*, and although badly crushed in the mail it seems to be *Lepisma domestica*, which Dr. Packard described from specimens found commonly around fireplaces in Salem, Mass. This insect feeds upon the paste in book bindings and wall papers, and will eat the surface of glazed paper of any kind. It can be destroyed by a free and persistent use of Persian insect powder or buhach."

(2) E. K. writes: I wish to employ a metal screw to work in iron and steel. What would be the best metal of which to make the screw, to prevent any rusting of screw or corroding? A. Use gun metal—copper 1 lb., tin 3 oz.—or phosphor bronze.

(3) J. L. B. asks: 1. Can cast iron be mended in any way? A. See page 98 of this issue for a practical method of soldering. 2. How can a person most easily melt copper and zinc? A. Melt copper in a crucible in a furnace or forge fire, and add the zinc if you wish to make brass. Otherwise melt zinc in an iron ladle over a fire. 3. How can copper, zinc, magnesia, sal ammoniac, quicklime, and cream tartar be compounded, and where can each be obtained? A. You can buy the materials through the drug and hardware trades. Mechanically compounded, they would only make a mixture without cohesion and of no value, and they are not susceptible of chemical combination. 4. How can moulds be made which can be used to mould badges? A. Moulds for brass may be made in fine moulding sand. For metals that melt at a low heat, moulds may be made of brass or iron. See Brass Founder's Manual, by Graham, which we can mail you for $1.

(4) J. F.—The sample arrow head you send is not of unusual shape; they are found of almost all conceivable shapes in New Jersey. Their being of white or black flint or jasper depends upon the source of supply of the material. You will find a most interesting account of the implements of the "stone age in New Jersey," fully illustrated, in the Smithsonian report for 1875, by Dr. C. C. Abbott, of Trenton. The flint implements are supposed to have been chipped with hammers of the same material upon anvils or bowlders, also of flint.

(5) G. W. R. writes: I have an old fashioned Siemens H-armature taken from a generator which I have tried to use in a motor, but there is a dead center where the armature hangs. How shall I remedy the difficulty? A. The armature will have a dead center, but when the strength of the magnetism of the armature is about equal to that of the field magnet, there will be no "hanging," provided the commutator is properly adjusted. Possibly you may have a commutator such as is used for alternating currents. If so, you will need to modify it somewhat. See SUPPLEMENT, No. 161, for full information on the subject.

(6) H. S.—The plant which you send to be named is *Eriodictyon glutinosum*, or vulgarly "Yerba santa." The leaves are the parts used in medicine. These have balsamic properties, and have long had a reputation among the Spanish settlers in California in diseases affecting the mucous membrane, such as chronic coughs, catarrhs, consumption, etc. A sirup prepared from the leaves is extensively used as a vehicle for the administration of quinine, as it has the property of extinguishing the bitter taste of that alkaloid, and of presenting it in a readily assimilable state.

(7) S. A. S. asks (1) how to clean nickel plate easily, without injuring the nickel. A. Use rouge, electro-silicon, whiting, or fine chalk, mixed with water. 2. How to make a glossy black, endurable enamel for polished steel? A. Use black japan varnish painted on the metal and baked hard in an oven at about 270° temperature. 3. A remedy for an obstinate case of catarrh in the head? A. For catarrh and its cure, see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 216, 84, 262.

(8) T. K. asks (1) if the tide flows up the Hudson River as far as Troy. A. It cannot be said that the tide flows up thus far; but the current of the river is affected by the tides as far north as the Troy dam, six miles above Albany. The fall of the Hudson River from Albany to its mouth, according to the U. S. Coast Survey reports, is only about five feet, which is a little less than the ordinary difference between high and low tide at New York, while it is a good deal less than some of our very high tides. 2. Was New York Bay frozen over during the revolutionary war? A. During the winter of 1779-80, New York Bay was frozen over from Staten Island, and 200 heavily laden two-horse sleighs crossed on the ice in a body at one time, escorted by 200 horsemen.

(9) W. W. C. sends an object for identification. A. The object is the seed pod of *Lunaria biennis*, a plant very common in old fashioned gardens, and known vulgarly as "honesty," from the transparency of the two valves of the pod.

(10) G. R. F. asks how canvas is prepared for artists' use, with a smooth surface. A. Grind equal quantities of white lead and whiting, well dried, with five parts of raw oil, add one part boiled oil; prime the cloth over on the face with a brush, palette knife or trowel. The latter is preferable, to those who can use it. After the canvas has had sufficient time to dry, scrape off from the back any superabundant color which may have passed through the canvas, then repeat a second coat on the face, leaving it as smooth as possible. When hard and dry, rub it smooth with a piece of light pumice stone and water, so as to cut off or lay all the knots in the canvas; then grind two parts white lead, two parts whiting, and one part burnt ocher, with a small quantity of pumice stone, all well ground separately, rather stiff in raw oil; afterward mix the whole, adding a little gold size; dilute with half raw oil and half turpentine, and apply a third, fourth, or fifth coat; repeat rubbing down with pumice stone and water until smooth enough for painting upon.

(11) W. L., Mo.—The right of private companies, not organized as State militia, to meet and drill with firearms is, in many States and most municipalities, restricted by statute, and permission therefor must be obtained of the authorities.—By act of Congress approved January 19, 1886, in case of the death of both President and Vice President of the United States, one of the Cabinet officers is to act as President, to succeed in the following order: Secretary of State, Secretary of the Treasury, Secretary of War, Attorney-General, Postmaster-General, Secretary of the Navy, Secretary of the Interior.

(12) C. S. writes: I make an imitation of Russia leather, but do not succeed in imparting to the same the exact odor of the genuine, which I have seen in other imitations. What essential oils are to be used? A. Use birch bark extract, imported from Russia, to be had of dealers in tanners' supplies. A slow process, using not too much of the extract, gives the more delicate and lasting smell of genuine Russia leather.

(13) R. M. R. asks: What will remove red wine stains from linen? A. See the table given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158, for the "Removal of Stains and Grease Spots."

(14) W. W. M.—Latitude of North American magnetic pole 70°, line of no variation, now passes through Eastern Ohio, West Virginia, and central North Carolina. The line of no variation is now moving westward. The annual advance being for Pensylvania about 3¾ minutes. The time of complete variation from extreme easterly to extreme westerly inclination of the magnetic needle is supposed to be about 300 years.

(15) Wm. S.—Graphite or black lead is much used for piston rod and valve rod packing. Mix it with cylinder oil or tallow, and smear the packing with the mixture. If fragile asbestos packing is used, the oil mixture is preferred. Graphite is not used in cylinders. It is liable to accumulate and clog. Use the best cylinder oil, which may be a mixture of petroleum with paraffine, or cold pressed refined lard oil, or with sweet refined tallow.

TO INVENTORS.

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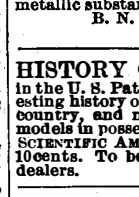

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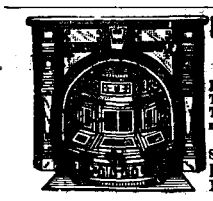

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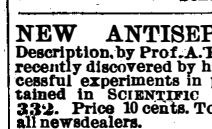

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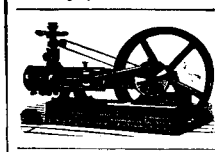

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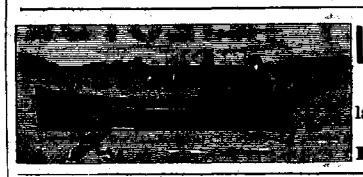
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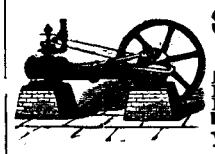
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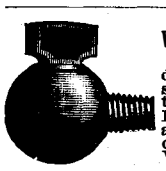
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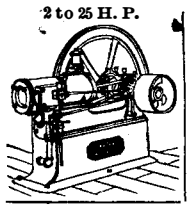
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NAVY DEPARTMENT,
WASHINGTON, D. C., *June* 28, 1887.

Under authority conferred by the act of Congress, approved March 3, 1887, making an appropriation "for the purchase and completion of three steel-cast, rough-bored and turned, six-inch, high-power rifle cannon, of domestic manufacture, one of which shall be of Bessemer steel, one of open-hearth steel, and one of crucible steel," sealed proposals from domestic manufacturers, to furnish the same, will be received at this Department until Tuesday, the second day of August, 1887, at 12 o'clock noon, at which time the proposals will be opened.

Proposals may be made either to furnish three completely finished six-inch, breech-loading, high-power rifle cannon, made from unforged castings, one of Bessemer steel, one of open-hearth steel, and one of crucible steel, or three unforged, rough-bored and turned castings for such cannon, of the same material, respectively, to be finished by the Department in accordance with the bidder's design.

* * * * * * * *

No gun or casting for a gun will be paid for until the gun "shall have been completed and have successfully stood the statutory test required by the act of July twenty-sixth, eighteen hundred and eighty-six," entitled "an act making appropriations for the naval service for the fiscal year ending June thirtieth, eighteen hundred and eighty-seven, and for other purposes." [For statement of requirements of said tests, and of other conditions to be observed, reference is made to "specifications" which can be had upon application to the Department.]

Proposals may be made for one or more guns or for one or more castings as aforesaid, * * * [but must be made separately for each gun, or casting for a gun, and upon forms prepared by the Department.]

Each successful bidder will be required to execute, within fifteen days after notice of award, a formal contract in accordance with his proposal, and to furnish a bond, with satisfactory sureties, in a penal sum equal to fifteen per cent. of the amount of his bid, conditioned for the faithful performance of such contract.

Copies of the specifications, with blank forms of proposals, and all additional information desired, can be obtained on application to the Bureau of Ordnance, Navy Department.

All proposals must be in duplicate, inclosed in envelopes marked "Proposals for Steel-cast Cannon," and addressed to the Secretary of the Navy, Navy Department, Washington, D. C.

The right is reserved to waive defects in form and to reject any or all bids.

WILLIAM C. WHITNEY,
Secretary of the Navy.

NAVY DEPARTMENT,
WASHINGTON, D. C., *July* 20, 1887.

In order to give more time to domestic manufacturers to consider the matter, the period limited for the reception of proposals for steel cast guns is hereby extended, and such proposals will be received, under the foregoing advertisement, as modified, until Tuesday, September 20, 1887, at 12 o'clock noon, at which time the proposals will be opened.

WILLIAM C. WHITNEY,
Secretary of the Navy.

Proposals for three Overhead Travelling Cranes complete, three Supports for such Cranes, and one Iron Frame for a Building.
NAVY DEPARTMENT,
WASHINGTON, D. C., *July* 23, 1887.

Sealed proposals will be received at the Navy Department, Washington, D. C., until 12 o'clock noon, on Thursday, the 15th day of September, 1887, at which time and place they will be opened in the presence of bidders, for furnishing the necessary material and labor and constructing, delivering and erecting the iron work for the supports of three overhead travelling cranes, the frame of one building, and three overhead travelling cranes complete, including attachments pertaining thereto, for the Ordnance Gun-shops at the Navy Yard, Washington, D. C., in accordance with plans which may be seen, and specifications, copies of which, together with all other information essential to bidders, may be obtained at the Office of the Civil Engineer at said Navy Yard. Proposals must be made in accordance with forms which will also be furnished on application to that Office.

Proposals must be made in duplicate and inclosed in envelopes marked "Proposals for Overhead Travelling Cranes complete, for Iron Supports for such Cranes, and Iron Frame for a Building," and addressed to the Secretary of the Navy, Navy Department, Washington, D. C.

The Secretary of the Navy reserves the right to reject any or all bids, as, in his judgment, the interests of the Government may require.

WILLIAM C. WHITNEY,
Secretary of the Navy.

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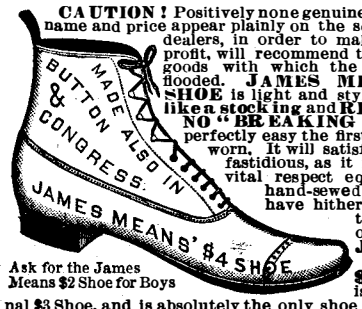

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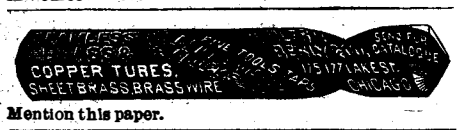

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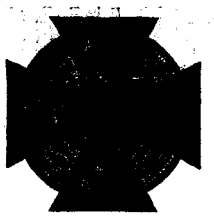
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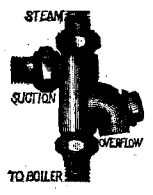

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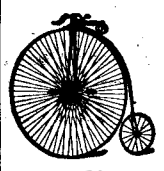
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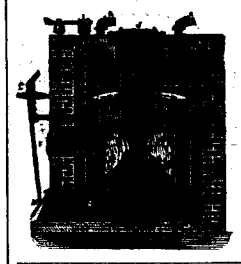
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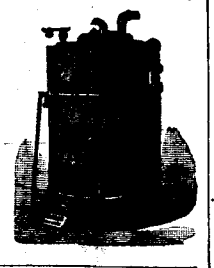

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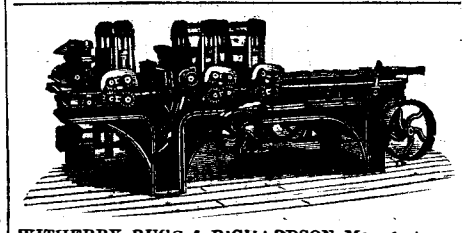
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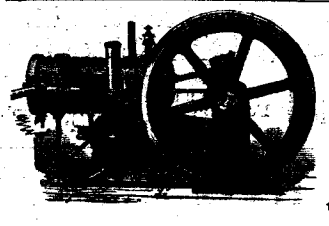
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